JANUARY, 1940

ELECTRICAL SOUTH

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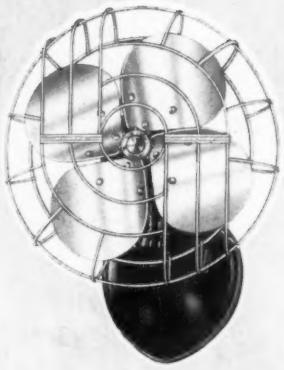
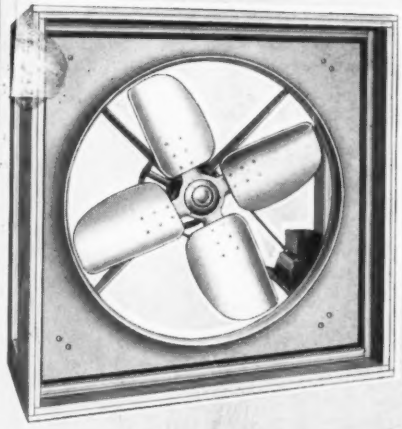


HUNTER is opening its 53rd Season in its exclusive production and sale of the world's finest quality fans and ventilators.

American hotels, apartment houses, stores, churches and homes may have the benefit of HUNTER engineering and sales research by writing for information which will be promptly sent without obligation.



HUNTER FAN
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DETROIT
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ATLANTA
CHICAGO
ST. LOUIS
NEW ORLEANS
PITTSBURGH
WASHINGTON

RICHELEAU APTS.
KANSAS CITY, MO.

THE SHERATON HOTEL
HIGH POINT, N.C.

HUNTER Century

ALABAMA HOTEL
ANNISTON, ALA.

BUCKEYE CONDUIT Softens Up a Tough Specification

●Here's the kind of job where Buckeye Conduit can help you make better time, keep down cost. Contractors call this a tough specification because those plate hangers are punched to size without clearance for a coupling and every length has to be inserted separately, a hole at a time and coupled in place. Tough on the contractor -- maybe -- but fine for the owners because of guaranteed freedom from vibration plus perfect spacing assuring a long and useful life.

Buckeye Conduit will speed up these tough jobs. Its highly uniform ductility makes it easy to throw a radius on a pipe. The threads come clean on the first cut, need no chasing, dies last longer and a coupling made up once is made forever.

Youngstown Buckeye Conduit Steel is carefully processed to produce a uniform ductility. The flexible lacquer lining is satin-smooth, offers a minimum resistance to fishing, and is tough. Fish wire won't scratch it, and a high non-conductivity factor is maintained with no flaking, no cracking.

Youngstown Buckeye Conduit works with you and for you on every job. With the help of Buckeye Conduit you'll make as good time on these tough ones as you might on less carefully drawn specifications.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

General Offices - YOUNGSTOWN, OHIO

Ask your distributor for Youngstown Conduit - Pipe and Tubular Products - Sheets - Plates - Tin Plate - Bars - Rods - Wire - Nails - Tie Plates and Spikes.

26-7B

BUCKEYE TRADE MARK YOUNGSTOWN CONDUIT

Control Board and Youngstown Buckeye Conduit in the new Toledo, Ohio, Vocational High School.

Supervising Architect - Edwin M. Gee, Toledo School Board

Electrical Engineer - Gil. Southern, Toledo, Ohio

General Contractor - Henry J. Spieker Co., Toledo, Ohio

[illegible]trical Contractor - [illegible]tric Co., Toledo, Ohio

YOUNGSTOWN

ADEQUATE WIRING SERVES AND SAVES

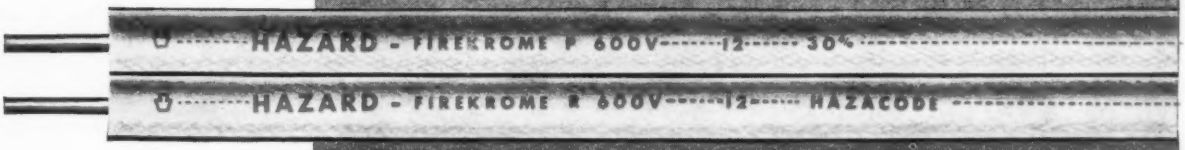
HAZARD BUILDING WIRE

marked for

TYPE, VOLTAGE, SIZE and INSULATION.

HAZARD PERFORMITE WIRE » » » a super-adequate wire for all important jobs. Super-aging and heat-resisting. Smaller sized copper safely carries your load.

HAZARD WATERTITE WIRE » » » for adequate wiring in moist places. Replaces lead encased cable. Approved by Underwriters Laboratory Section 3035 National Electric Code. Type "R.W." marked every few inches to insure identification by inspector.



HAZARD 30% BUILDING WIRE (Performance Grade) and HAZACODE (Code Grade) Adequate Wire » » » for all standard service jobs. Imprinted every 2 feet. Six standard colors. Meets requirements of the National Electric Code Standard.

Your jobber will supply all Hazard Building Wires.

HAZARD INSULATED WIRE WORKS

DIVISION OF THE OKONITE CO

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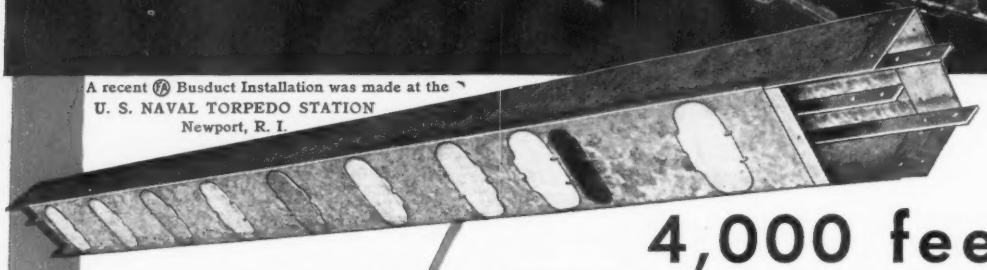
Entered as second-class matter at post-office in Marietta, Ga., under the Act of March 3, 1876.

A recent (FA) Busduct Installation was made at the
U. S. NAVAL TORPEDO STATION
Newport, R. I.

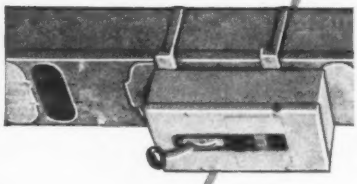


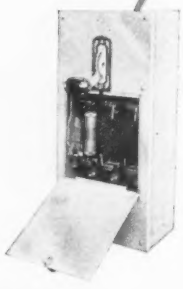
4,000 feet

on one construction job — 2,000 on another — 500 on another! These recent installations of

(FA) PLUGIN BUSDUCTS

indicate a growing appreciation — on the part of architects, electrical engineers, contractors and plant engineers — of the convenience, efficiency and economy of this type of distribution.





The Modern, Compact, Flexible and Efficient Method for Power and Light Distribution

(FA) Plugin Busducts consist of standard 10-foot sections, arranged with nine plugin outlets on 12-inch centers. 2, 3 and 4 wire feeder systems. 250 volt D.C., 575 volt A.C., maximum.

Busducts are made of galvanized steel or aluminum, with proper support for attaching to either walls or ceilings. Flexibility of installation is provided by suitable elbows, tees, end boxes, intermediate feed-in and feed-out boxes — all adapted to fit required space or position. Future extensions may be made readily to existing installations.

Bus bars are of copper — rigidly supported at 30-inch intervals with insulating blocks that assure proper spacing to meet requirements of the National Electrical Code. Contact surfaces of connecting bars are silver-plated to prevent oxidation.

Send for further information — let us show you how you can use (FA) Plugin Busducts to arrange most effectively the distribution system—economically, easily and according to the latest accepted practice. Frank Adam Electric Company, St. Louis, Mo.

(FA) SHUTLBRAK SAFETY TYPE ENCLOSED SWITCHES

Now in production. For heavy-duty industrial use. High-grade, rugged construction, embodying a new switching principle — *the movement of a shuttle in a totally enclosed chamber.* When the current is broken, the final arc is taken by specially constructed arcing tips *on the reverse side of the clips* from where the current is normally carried. . . . Priced no higher.

EST. 1891 THE SIGN OF A BETTER JOB
FA
Frank Adam
PLUGIN BUSDUCT
FRANK ADAM ELECTRIC CO.
ST. LOUIS, MO. U.S.A.

A Frank Statement

About Kelvinator's Radically New 1940 Program That Makes Possible Sensationally Low Prices . . . And Greater Profits for Dealers

BY FRANK R. PIERCE, General Sales Manager
Kelvinator Division, Nash-Kelvinator Corporation

I KNOW you will be surprised when you see the prices printed on these pages.

A few days from now they will be published across the country. But before that happens, I want to explain them to all retailers of mechanical refrigerators—because there is not one of you who won't be affected, no matter where you may be located.

Those who built our industry—the dealers—have been waiting for several years for some manufacturer to have the courage to give them a program which meets today's conditions in the refrigeration business.

In a word: Kelvinator's prices and products for 1940 are part of a single broad-gauge program . . . representing radical changes in fundamental policy . . . one that is sound as a dollar from start to finish . . . a program that has these objectives:

1 To protect and stabilize the profits of Kelvinator dealers.

2 To meet the competitive price situation in the electric refrigeration business today.

3 To step up to the replacement business by providing specific products with margins adequate for the dealer to sell this business at a profit.

4 To limit the number of dealers in each community so that sufficient volume is possible, at recommended prices, for dealers to make a profit.

5 To reduce the dealers' investment by reducing the number of models.

In a nutshell, we expect this program to result in increased volume and profits for our dealers and ourselves.

This program is—very candidly—one of the most far-reaching plans ever adopted in an industry. But before I go any farther, I want to make one thing clear. Not only has it been accomplished without a penny's reduction in dealers' retail profits—but without a single compromise in the quality of our product. As a matter of fact, dealers' profits are higher; and the products the best we've ever built.

I think that every dealer who has ever wished for lower prices is entitled to know how Kelvinator was able to put this program into effect:

Briefly, here's what we have done:

1 We've concentrated 96% of our production on the big 6 cubic-foot size models, and larger, that people really need. That lets us lower the price some.

2 In anticipation of greatly increased sales, we've *doubled* our production schedules and passed the manufacturing savings on.

3 We've cut our cost of selling—so we can lower our price still further.

In addition, we have cut our own manufacturing profit per unit in anticipation of greater sales.

And . . . to further simplify dealers' price problems . . . in all states east of the Rockies, we are paying the freight, on carload shipments to destination, and also absorbing the L.C.L. delivery cost from zone or distributor warehouses in excess of 50 cents CWT. This is to permit advertising nationally of suggested retail prices for delivery in the consumers' kitchens.

Now please take a look at the pictures and specifications of the Kelvinators we're selling at these prices.

LOOK AT THE SIZE
LOOK AT THE NAME
LOOK AT THE PRICE
BIG 6¼ CUBIC FOOT Large "Family-Size"
NEW 1940 KELVINATOR from the oldest maker of electric refrigerators
$119.95* Delivered in the Kitchen with 5 Year Protection Plan
KELVINATOR SS-6. Compare with $150 refrigerators. 6¼ cu. ft. Bright Permalux exterior. Porcelain-on-steel interior. Stainless-steel, high-speed Freezer with white Permalux-finished door. 2 extra-fast Freezing Shelves, 9 lbs. — 84 ice cubes. Kelvin Cold Control. Tempered glass, Cold Storage Tray under freezer. Interior Light. Powered by famous cost-cutting Polarsphere sealed unit. Kelvinator's price only $119.95*

THE BEST KELVINATORS EVER BUILT NO PRIOR-YEAR MODELS

You will note first of all that price reductions apply to the whole Kelvinator line . . . from the base-price model right up to the de luxe models. Reductions range from $30 to $60, as compared with last year's prices.

Next thing is: every Kelvinator here is a new *1940* product. There isn't an obsolete last-year model in the line.

Our idea of meeting low-price competition is *not* giving our dealers a year-old model, with probably shorter discounts. Instead, we're starting our dealers with a clean, *new* stock.

And these Kelvinators are remarkable in another respect. You've heard of "bargain" refrigerators before. This isn't it. You've probably had to contend with stripped-down, second-line products. You won't find them here.

Let me repeat: *these are the finest Kelvinators we know how to build—1940 models every one.* Starting with the fine, big, six-cubic-foot models, and working right on up through the big de luxe jobs, they surpass any Kelvinators ever built before.

I can't stress this too strongly.

Take our Model SS-6 for 1940, selling at $119.95.* If you'll examine it carefully, point for point, I know you'll agree you've never seen a current model made by a nationally-known manufacturer within thirty or forty dollars of its price!

Try to match its specifications and you'll see what I mean. Every Kelvinator is powered by the big Polarsphere sealed unit. We don't use a cheaper, weaker unit in our low-priced models. I think you know about the reliability of this unit. Of *all* the 1939 Polarspheres in use all over the world less than ½% have been replaced for mechanical reasons. I believe that's an industry record.

Other basic features are of the same high quality. Cabinet is welded-steel and finished in Permalux outside . . . all Porcelain-on-steel lining within. Insulation is the best.

Yes—it's a big, solid, fine-looking refrigerator. And any dealer will say—it has the features that *sell.*

But it's only the beginning of Kelvinator's great 1940 line. Every model in the line has "step-ups" in features that make "selling up" natural, logical and easy.

EVERY FEATURE OTHERS OFFER PLUS OUR OWN EXCLUSIVES

And when you handle that beautiful de luxe job . . . Model HD-6 . . . for only $209.95*—you have a refrigerator nobody's competing with.

With the new "Moist-Master" humidity system and all those other features you can see on the next page—it's the last word in fine refrigeration.

I want you to check this when you look at the pictures. And note that the price is what you used to sell "standard" models for.

Just count them. Five big "sixes". Prices from $119.95* to $209.95.* Compact three and four-footers, too (but it's just as easy, now, to sell a "6") and 3 eight-cubic-foot models.

Can you imagine what Kelvinator dealers will do with products and prices like these?

I'll tell you. They'll stop worrying about competition in any shape or form. They'll sell Kelvinators at a profit and lots of 'em. I don't believe they'll find it necessary to cut their prices to meet competition.

TWO VAST MARKETS ARE NOW WIDE OPEN TO KELVINATOR DEALERS

But . . . far beyond "meeting competition" . . . Kelvinator dealers will also cut straight into two vastly broadened markets.

One is the replacement market. You know scores of families right in your own neighborhood who are still getting along on worn-out, noisy, wasteful or undersized mechanical refrigerators.

As a matter of fact, there are at least *four million* families like that in the country.

When you go into that market with the 1940 Kelvinators especially designed and priced for that market . . . when you show them the bigger, finer, refrigerator with every modern convenience . . . when you prove it costs many dollars a year less to run—*that replacement business is yours.* And you can afford to trade at a profit because the prices and margins are there to help you trade.

And then there's that vast low-income market adequately provided for with models selling this year from $30 to $60 less than similar models in 1939. Only this year they are better looking and have more salable features.

You'll be able to sell a Kelvinator—a big, genuine 6¼-cubic-foot model . . . with Kelvinator quality through and through . . . for little more than the price of a good icebox. Further, for those who want additional equipment, convenience and de luxe features, Kelvinator has four more "Sixes" at prices that will fit their pocketbooks.

HEAVY ADVERTISING CAMPAIGN

I think you'll agree . . . this is a great product story. Actually, it is one that others have wanted to offer for years. And now Kelvinator does it.

But we're not just letting our 1940 product "sell itself". We're going to spread the news big—and spread it *now.*

In a few days, newspaper ads in large, dominating space will carry Kelvinator's story to local markets clear across the country.

Close on their heels, full-page color ads will break in national magazines.

You'll see "Look at the Size" . . . "Look at the Name" . . . "Look at the Price"—*everywhere.*

POWERFUL PROMOTION BACKING

I'll venture to say that our coming Spring Showing Activity will bring you the greatest rush of business you've had in years.

We'll be backing you with a great new Direct Selling Program and complete sales training helps from the Kelvinator National Salesmen's Institute.

Kelvinator's own finance company . . . ReDisCo . . . has even worked out a brand new "5-Sixes Plan" to make it easier for you to buy—so you can start selling quicker.

Frankly, I think this is the most far-reaching program any manufacturer will offer this year. It's not only a matter of products, prices, margins, prepaid freight, new advertising, and new sales methods. In fact, it's a *whole new way of doing business and making money.*

HOW TO GET FULL FACTS

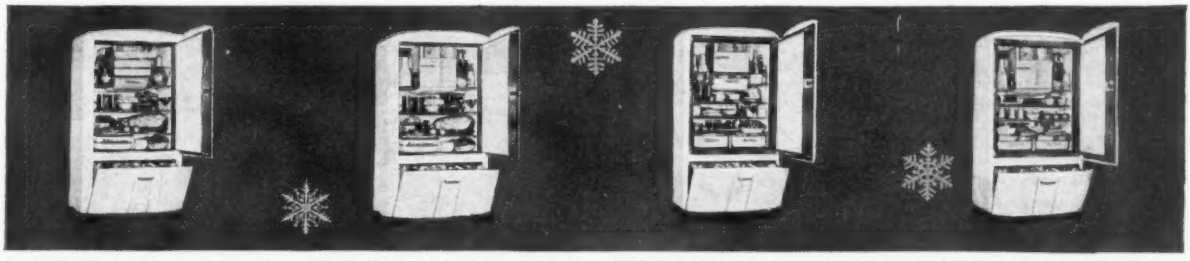
If you are not a Kelvinator dealer, the only way to realize what this revolutionary program means is to get in touch with us through your nearest distributor or factory branch.

Or, if you like, communicate with me direct.

Frank R. Pierce

General Sales Manager
KELVINATOR DIVISION
Nash-Kelvinator Corp., Detroit, Mich.

**Prices suggested are for delivery in the Kitchen with 5 Year Protection Plan. State and local taxes are extra. Prices are slightly higher west of the Rockies.*

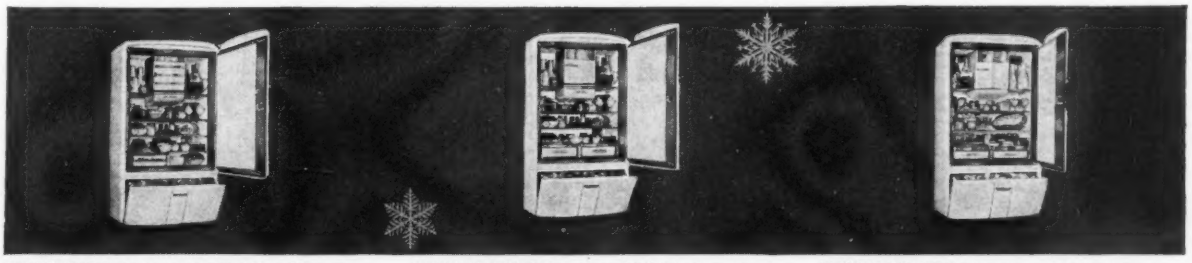


KELVINATOR S-6. Compare with $180 refrigerators. 6⅓ cu. ft. completely equipped model. Gleaming Permalux exterior with Porcelain-on-steel interior. Sliding glass covered Vegetable Crisper. Deep, sliding, moonstone glass Cold Storage Tray under Freezer. Vegetable Bin. Removable half-shelf next to crisper. Stainless-steel freezer with door, 2 extra-fast Freezing Shelves, 8 lbs.—64 ice cubes, new type Ice Trays. Kelvin Cold Control. Powered by Polarsphere sealed unit. Interior Light. Kelvinator's price only $139.95*

KELVINATOR HS-6. Compare with $230 refrigerators. A new 6 cu. ft. Kelvinator with the "Moist-Master" System that maintains higher humidities, decreasing the loss of moisture from foods. Permalux exterior and Porcelain-on-steel interior. Meat Compartment built in the freezer unit behind freezer door. Sliding, glass covered Vegetable Crisper. Vegetable Bin. 2 extra-fast Freezing Shelves, 8 lbs.—64 ice cubes, new type Ice Trays. New, flat, disc-type Kelvin Cold Control. Powered by Polarsphere sealed unit. Interior Light. Kelvinator's price only $169.95*

KELVINATOR R-6. Compare with $210 refrigerators. 6.5 cu. ft. Twin Sliding Crispers with glass tops. Sliding, Porcelain Cold Chest. Vegetable Bin. Sliding adjustable Shelves. Twin dome Lights. Stainless-steel Freezer with door, 2 extra-fast Freezing Shelves, 8 lbs.—72 ice cubes, built-in Tray Lifter and built-in Speedy-Cube Release. Double-size Ice Tray for frozen desserts. Kelvin Cold Control with automatic return from defrosting. Powered by Polarsphere sealed unit. Kelvinator's price only $179.95*

KELVINATOR HD-6. Compare with any refrigerators from $230 to $300. A new, 6.1 cu. ft. de luxe Kelvinator with "Moist-Master" System. Twin Sliding Crispers with glass tops. Vegetable Bin. Meat Compartment built in the freezer unit behind freezer door, 2 extra-fast Freezing Shelves, 8 lbs.—72 ice cubes with built-in Ice Tray Lifter and Speedy-Cube Release. New, flat, disc-type Kelvin Cold Control. Twin Dome Lights. Polarsphere sealed unit. Permalux exterior. Porcelain-on-steel interior. Kelvinator's price only . . $209.95*



KELVINATOR S-8. Compare with $220 refrigerators. A big 8.2 cu. ft. refrigerator with 16.3 square feet shelf space. Has Stainless-steel freezer with white Permalux-finished door. New type ice trays freeze 12 lbs.—96 cubes. Sliding glass covered Crisper, Glass Cold Storage Tray, Vegetable Bin, Automatic Interior Light. Beautiful Permalux exterior, stainless Porcelain-on-steel interior. Powered by Polarsphere sealed unit. Kelvinator's price only . . $189.95*

KELVINATOR R-8. Compare with $250 refrigerators. 8.2 cu. ft., 16.3 square feet shelf space. Built-in Tray Release and Speedy-Cube release, 12 lbs.—108 ice cubes. Stainless-steel Freezer with new full height door. Twin glass covered Crispers, Twin dome Lights. Sliding porcelain Cold Chest, Vegetable Bin. Kelvin Control with Automatic return from defrosting. Sliding Adjustable Shelves. Powered by Polarsphere sealed unit. Kelvinator's price only $209.95*

KELVINATOR HD-8. Compare with the finest refrigerators at any price. A new de luxe 8 cu. ft. model completely equipped including "Moist-Master" System. 15.9 square feet shelf area, Twin Sliding Crispers with glass tops, Twin Dome Lights. Meat Compartment built in freezer unit behind door, built-in Ice Tray Lifter and Speedy-Cube Release, 12 lbs.—108 ice cubes. New, flat, disc-type Kelvin Control. Vegetable Bin. Polarsphere sealed unit. Kelvinator's price only $239.95*

For 1940 Kelvinator Presents The Electric Range That Has Everything!

It's New from start to finish! Designed and built by Kelvinator. Has all the features and eye appeal women want in a modern electric range . . . Priced Competitively Low!

Here's the line that "has everything", including all time-proved features, plus extra KELVINATOR EXCLUSIVES that give Kelvinator dealers a big competitive advantage.

WE STARTED from scratch on these big Kelvinators. When we were through building, we had something *absolutely new*. Compare them, feature for feature, with any range on the market. There isn't one that can match them.

Look at Kelvinator's *oversize*, flood-lighted 16" x 16" x 19" oven. Has *two* high-wattage heating units, for fast pre-heating and "even" heat.

And here's a Kelvinator "plus"—a new-type Cooking Timer that eliminates "counting back" to figure out correct setting. In Kelvinator's de luxe model this Cooking Timer controls *three* positions ... can be connected to oven, Scotch Kettle or appliance outlet. Controls fourth position when Scotch Kettle is installed in drawer.

Each Kelvinator Chromalox surface unit has *five* heats controlled by switch-knobs set in a recessed flood-lighted panel. And each switch-knob has its own "heat signal" light.

Kelvinator household models are built to give maximum rigidity—with one-piece,welded body, vitreous porcelain-on-steel. Finest glass-wool insulation—three inches on top and two on sides, back and bottom. All switches, oven thermostats, built-in timers—front serviced.

Quality features, eye-appeal and competitive prices—all are there to enable Kelvinator dealers to quickly make money in this tremendous, new appliance market.

In a recent national survey, 33.4% of fuel range owners interviewed said their NEXT range would be electric. This shows millions are range prospects *right now*.

The time is ripe for you to get a big piece of this business, with a product that's *years ahead* of competition! Tie in with Kelvinator's big electric range advertising campaign featuring "the range that has everything"—in color ads in national magazines . . . local ads and sales promotion materials.

By itself, Kelvinator's range line fits into any appliance dealer's business. With Kelvinator's refrigerator franchise, it gives you a *double* profit-opportunity! Get all the facts from your nearest distributor or factory branch—or wire or write today to Sales Dept., Range Div., Nash-Kelvinator Corp., Detroit, Mich.

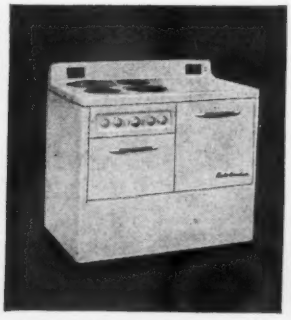
MODEL ER-59. De luxe model, newly designed. Equipped with built-in Cooking Timer combining electric clock, automatic Computing Timer, Signal Light and Minute Minder with 60-minute dial. Kelvinator Selector Switch connecting Cooking Timer with oven, Scotch Kettle or appliance outlet. Automatic Oven Flood-light, individually lighted Switch Knobs in recessed panel. Warming drawer compartment with automatic Temperature Control. Plus all the general features.

EVERY 1940 KELVINATOR HOUSEHOLD RANGE HAS THESE IMPORTANT FEATURES

5-Speed Kelvinator Chromalox Surface Units • Over size two-unit oven • Porcelain enamel on steel cabinet • One-piece welded body construction • 5-Heat bi-rotary silver contact surface unit switches • "Broil" and "Bake" Pilot Lights • Recessed, slanting switch panel • Utility Drawer • Combination broiling pan with non-tip grille • 6-quart Scotch Kettle • Combination oven switch and thermostat with pre-heat cut-off • Heat-seal, counterbalanced oven door with broil stop.

MODEL ER-49. New design. Has all the de luxe features of the ER-59 except the Automatic Cooking feature. Built-in Minute Minder, Super-Fast 5-Speed Kelvinator Chromalox surface units, individually lighted recessed Switch Knobs, Over-sized Oven with Automatic Flood-light, Warming drawer Appliance Outlet, Plus all general features.

MODEL ER-39. Beautiful new design loaded with features for the woman who wants a high quality range at a moderate cost. Includes all general features plus automatic Oven Flood-light, Cooking Top Light, Appliance Outlet. Super-fast 5-Speed Kelvinator Chromalox surface units and 3 Utility Drawers. Warming drawer, slight extra cost.



MODEL ER-29. Full cabinet model, beautiful new design equipped with Super-Fast 5-Speed Kelvinator Chromalox surface units, "broil" and "bake" Pilot Lights, Has Combination Oven Switch and Thermostat with automatic pre-heat cut-off, Appliance Outlet on wall guard, large Utility Drawer—plus all the other general features.

MODEL ER-19. A low-priced, semi-leg, leader model, with sound selling features including 5-Speed Kelvinator Chromalox Heat-Flo surface units, Utility Drawer, Appliance Outlet, oversized Two-unit Oven with one-piece Porcelain enameled lining, Oven Switch and Thermostat with automatic pre-heat cut-off—plus all other general features.

Kelvinator's New 1940 Washers "The 5-Star Value" Backed by "The 5-Star Program"

Even Hotter than our Champion 1939 line. You know there are no finer features than Kelvinator's Fin-Flex Agitator and Fabric-Saver Wringer with Pressure Pilot. Now imagine how these improved 1940 Products will sell!

IT WAS A TALL ORDER for us to improve on those 1939 Kelvinator Washers that were acknowledged to have as much eye appeal, to be as efficient and quiet as any washer on the market.

But we did it.

And along with this "5-Star Value" we are giving you *the strongest selling story* a dealer ever had—proof of faster, cleaner, safer washing action—all in a ten-minute demonstration any salesman can make. This "5-Star Program" includes newspaper advertising on a liberal cooperative basis . . . printed literature . . . special Point-of-Sale Displays that are new and different . . . made-to-order Promotions and Traffic-Building plans . . . New Big 4 Financing Floor Plan that enables you to put this entire program into operation at once.

Look at the four washers illustrated—they are truly 5-Star Values. Check over these values and you'll agree . . . ★Beautifully styled; finished in gleaming baked Permalux . . . ★Fabric-Saver Wringer with the Pressure Pilot; safe for the user and safe for clothes . . . ★Fin-Flex Agitator that washes faster and cleaner than ever . . . ★Silent-mesh transmission; a really trouble-free mechanism . . . ★The Kelvinator Name; recognized by the public as a standard for dependable quality merchandise.

Here are real values—The 5-Star Values. And there's a model for every budget—each one featured for STEP-UP selling.

What's more . . . there's PLUS profit for you in the Kelvinator prices. There's a full line—with every feature that *sells.*

Look these washers and ironers over carefully. You can see for yourself—that this is the line you can *sell*—at a profit—in 1940.

1940's BIGGEST WASHER VALUE!

Kelvinator Washer Model 9D . . . Beautiful . . . quiet and dependable! Look at these features that prove Kelvinator's superior quality:

★ Fabric-Saver Wringer, balloon type rolls, 4 coil springs. Pressure Pilot shows correct settings for all fabrics. Extra safe with instant action, bar-type pressure release. Has full Underwriters' Laboratory approval.

★ New, improved Fin-Flex Agitator of nickel-chrome protected aluminum . . . cleanest-washing, *gentlest* type designed.

★ Silent-mesh transmission . . . only 5 moving parts . . . oil supply sealed-in . . . so quiet you can't hear it run.

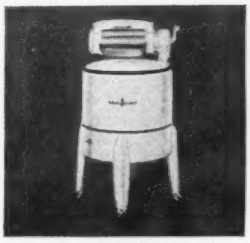
★ Rigid construction, one piece base. White durable, baked Permalux finish.

★ Tub is gleaming white Porcelain Enamel, inside and out. 10 lb. washing load.

★ Automatic timer shows recommended time for washing various materials. Stops machine at predetermined setting.

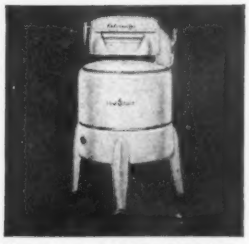
★ Large rubber wheels . . . locking-type Casters . . . foot-control Clutch.

★ Unexcelled value with exclusive features.



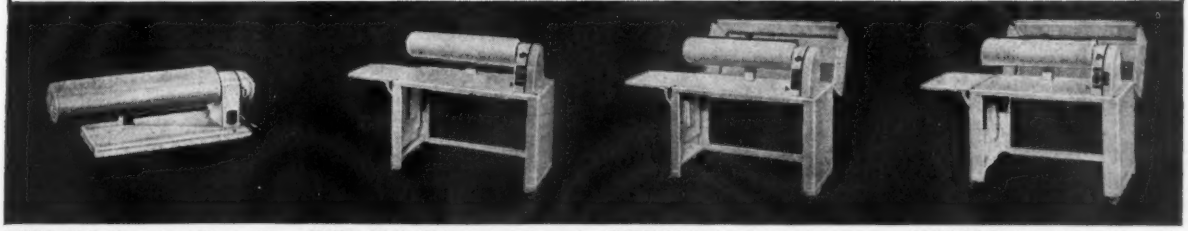
MODEL 5-D—KELVINATOR QUALITY throughout. Bar-Spring Wringer with Balloon-type Rolls and Safety Release on both sides . . . Fin-Flex Agitator . . . 7 lb. washing load . . . Silent-mesh Transmission . . . Tub is white Porcelain Enamel inside and out—white baked Permalux base.

MODEL 7-D—FOR BETTER PERFORMANCE. Fabric-Saver Wringer with Pressure Pilot. Tub is white Porcelain inside and out—8 pounds washing capacity. Base of white baked Permalux. Silent-mesh Transmission with only 5 moving parts sealed in oil. Locking-type Casters.



MODEL 8-D—LARGER CAPACITY. 9 lbs. washing load. White Porcelain Tub. White baked Permalux base. Locking-type Casters. Nickel-chrome protected aluminum, Fin-Flex Agitator. Fabric-Saver Wringer with Pressure Pilot. Silent-mesh Transmission with only 5 moving parts.

KELVINATOR IRONERS FOR 1940—A WORTHY COMPANION LINE TO GET THOSE EXTRA SALES



MODEL 30-D. Portable table model. Finished in lustrous white baked Enamel. Has thermostatic Heat Control and pilot light signal to show when current is turned on. Easily operated by finger-tip and foot pressing Controls. Heavily padded roll twenty-one inches long . . . five inches in diameter, both ends open.

MODEL 59-D. White baked Enamel finish. Equipped with flush-type, fold-down Utility Shelf. Selective knee and finger-touch Button Control of shoe operation. Thermostatic Heat Control. Emergency release Lever located on shoe. Has special Ruffler Plate for fancy frills. Mechanism operates in continuous bath of oil.

MODEL 69-D. All white cabinet type. Selective knee and finger-touch Button Control of shoe operation. Equipped with flush-type End Shelf. Emergency Release mechanism located in shoe. Selective thermostatic Heat Control. Special Ruffler Plate on shoe for fancy frills. Mechanism operates in bath of oil.

MODEL 89-D. All white de luxe cabinet type. Two-speed motor. Selective knee and finger-touch Button Controls. Hardened steel, chrome plated shoe, with 2 thermostatic Heat Controls. Equipped with flush-type End Shelf. Pilot light shows when heat is on. Special Ruffler Plate for fancy frills. Emergency Release Lever on shoe.

UNIVERSAL'S *Superheat Unit*

breaks Electric Cooking

SPEED RECORDS

FASTEST BY TEST!

The Universal Superheat Unit lets you sell on *proof!* Simple, dramatic Stop Watch Test *proves* new unit speed . . . *proves* new oven speed. Customers convince themselves.

The Nation's

FASTEST...

MOST AUTOMATIC..

MOST ECONOMICAL

ELECTRIC RANGE

NEW Universal Superheat Units are fastest—BY TEST.
NEW Illuminated Magic Eye Oven Control automates old types...Combines all controls in one.
NEW Select-A-Trol permits Timer Control to be used with Convenience Outlet as well as oven.
NEW Melt-I-Heat Surface Controls dial over 101 different heats . . .
NEW, larger Bake-Fast Oven has been PROVED fastest . . . PLUS Quik-Speed Broiling.
NEW Serv-A-Drawer with Serv-A-Tray automatically keeps foods hot and serves direct from range to table.

RANGE SENSATION OF THE YEAR! Breathless new beauty. Thrilling new speed. And—for the first time on any electric range—over 101 different heats for surface cooking.

Here's more! Universal is stepping out with a smashing promotional campaign: National magazine advertising . . . PLUS a tie-in with Modern Kitchen Bureau's program and coast-to-coast newspaper advertising.

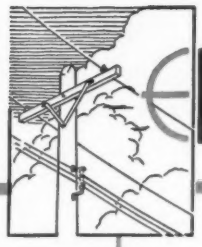
Universal's got the range for '40. Universal's got the program. Wire or write for full details today.

Universal ELECTRIC RANGE

Made by LANDERS, FRARY & CLARK, New Britain, Conn.

JANUARY
1940

Volume 20 No. 1



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ATLANTA, GEORGIA

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Filling Empty Sockets!

The right size bulb story in terms everyone can understand

This kind of copy helps fill empty sockets

Eyesight is precious — light is cheap

Should married people fight?

"YOU'D FIGHT!" says Elmore Haring. "If you lived with a chronic bulb-swapper, I go to read, and my wife has hooked the 100 watt bulb from my reading lamp and put it in the kitchen! I start to shave, and by golly she's even swapped bulbs in the bathroom. So I carve myself to ribbons by the light of a measly 25 watt bulb! It's an outrage, me living in a wilderness of empty sockets and misfit bulbs!"

"THAT'S SILLY!" exclaim the Wheatleys. "What's the use of fighting about light, when even the new brighter 100 watt G-E MAZDA lamps cost only 15¢? We keep a half dozen 'extras' always on hand, and never worry about wrong sizes, empty sockets, or eyestrain!"

WATT to do about it...

IF YOU want to keep peace in the family, and put an end to eyestrain and headaches caused by bad light, check your lamps and fixtures now with the chart at the right. And if you find 40 or 60 watt bulbs sneaking in where 100's or 150's should be, run, don't walk, to the nearest store that sells G-E MAZDA lamps. The new brighter 100 watt size costs only 15¢, and a penny or two will light one all evening! *They stay brighter longer!*

Check your bulbs now with these right sizes

I. E. S. BETTER SIGHT TABLE, END TABLE, JUNIOR FLOOR LAMPS, LAUNDRY, GARAGE	100 WATT	15¢
LARGER I. E. S. TABLE AND FLOOR LAMPS, KITCHEN, HOME WORKSHOP AND GAME ROOM	150 WATT	20¢
2-SOCKET READING LAMPS AND PIN-TO-WALL LAMPS WITHOUT DIFFUSING BOWL	75 WATT	15¢
BATHROOM — WALL BRACKETS BESIDE MIRROR	40 OR 60 WATT	15¢
I. E. S. THREE-LIGHT FLOOR LAMPS AND FIXTURES DESIGNED FOR 3-LITE BULB	100-200-300 WATT	60¢

G-E MAZDA LAMPS
GENERAL ELECTRIC

THIS ad in a recent COLLIER'S was read by 2½ times more people than the average ad in that issue. It is typical of the millions of messages General Electric is running this spring to sell Better Light - Better Sight.

G-E MAZDA LAMPS
GENERAL ELECTRIC

Electrical Business Trends

A RISE of approximately 10% for the year 1940 over the business experience of 1939 in the electrical manufacturing industry is estimated in the year-end report of W. J. Donald, managing director of the National Electrical Manufacturers Association, New York.

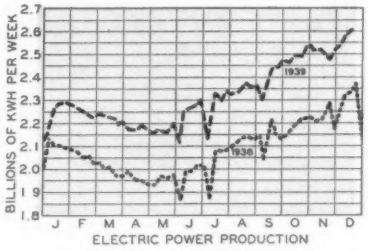
"The outlook is one of optimism, and the expectation is for a successful year."

This forecast is based on an expected rise in general business of from 5 to 10%, and a 10 to 15% increase in the durable goods field. It is felt that the electrical manufacturing industry should do as well as the average for durable goods lines.

The estimate for 1940 is based primarily on the anticipated advance in four lines of economic endeavor.

1. The demand for electric power is expected to reach a new high. The utilities have an estimated budget of $600,000,000 for construction during the coming year, in anticipation of a business rise and national defense needs.

2. The level of general business activity is expected to go forward 5 to 10%.



Per Cent Changes 1939 Over 1938

	Week Ending Dec. 23	Week Ending Dec. 16
New England	+10.3	+12.1
Middle Atlantic	+ 8.1	+ 8.4
Central Industrial	+15.8	+15.1
West Central	+ 7.8	+ 7.8
Southern States	+12.0	+12.1
Rocky Mountain	+ 3.3	+ 5.2
Pacific Coast	+ 8.9	+ 7.4
Total	+11.8	+11.6

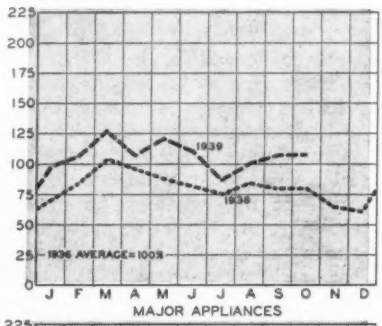
3. The expected advance of general business should lead to increased purchasing power, to the extent of an approximate $2,000,000,000 increase in the national income. This forward pace is important, particularly in the electrical consumer goods lines.

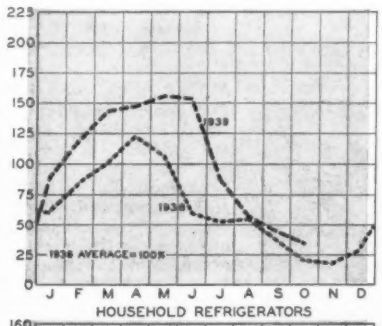
4. A continuation of the upward movement in residential construction is expected. Construction is looking toward its best year since 1930. The development of practical low-cost residential units to be built around the $2,500 level would aid this advance in the construction industry, the success of which has an important bearing on the durable goods fields.

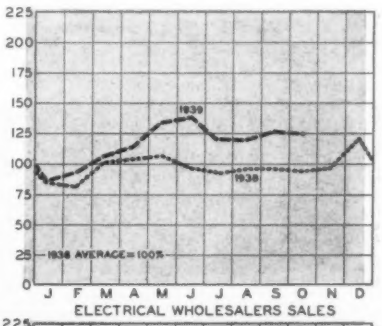
Two factors have an important bearing on the forecast. It is stated that "the war and the ever-present hazard of American involvement is a real factor. The coming year gives every appearance of being one fraught with economic and political consequences of international importance. It is difficult to foresee the future theatre of war operations, and the intensity of such operations as 1940 unfolds. The coming election in November is also of prime importance."

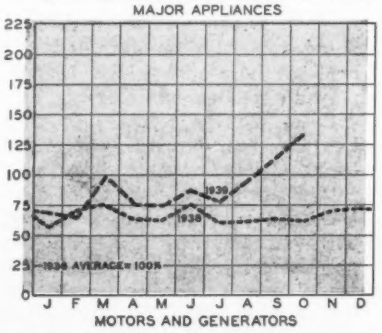
The release also presents secondary factors that may play an important part in the prospects for 1940.

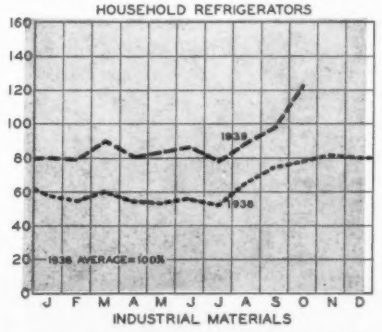
(*Continued on page* 64)

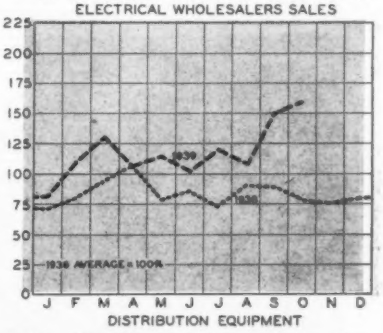












All of the above indexes of electrical business activity are based on figures available from the National Electrical Manufacturers Association, except the index of electrical wholesalers' sales which is based on data published by the United States Department of Commerce. The indexes on motors and generators and distribution equipment are based on orders received, while the index on industrial materials, including such items as electrical porcelain, mica, vulcanized fiber and laminated products, is based on sales billed. The index on distribution equipment includes such items as high voltage insulators, paper cable, power switching equipment, power distribution transformers, and varnished cambric cable. The index on major appliances does not include refrigeration and is based on sales billed. The index on household refrigerators includes complete household refrigerators, separate household evaporators, and separate systems of 1/4 horsepower or less. The index on electric power production is based on data released by Edison Electric Institute.

Cash Register Symphonies From "Traffic" Appliances

By H. B. Donley*

Manager, Appliance Dept.
Westinghouse Elec. and Mfg. Co.

IN its efforts to sell big ticket merchandise in competition with the new car, new fur coat, and other major family purchases, the electric industry has moved the interest of Mr. and Mrs. Average American from the garage to the kitchen. But, in our eagerness to do this with the speed demanded, we have, one and all, been inclined to overlook consideration of the smaller items from which the electrical merchandising business sprang. In spite of our efforts and not because of them, traffic appliances produced an annual dollar volume amounting to one-third that of electric refrigerators—equal to that of electric washers—twice that of electric ranges—six times that of ironers and water heaters.

The list of traffic appliances now enjoying flourishing sales is broad and varied. It ranges from curling irons and warming pads through a growing variety of table appliances, electric irons and fans to the popular electric roaster. For the last twelve months their retail volume totaled some $70,000,000. These appliances of low unit price —average $5.00—are selling because people want them, find them useful and convenient, and because quite a number of these people have actually been able to find a store displaying and selling them.

Let's look at the retailer who sells these appliances. How does he gain? Well, he makes a profit on their sale. But he could sell twice as many without material increase in inventory and make more than twice as much on his investment. He could do it without material increase in cost of doing business and thus increase his margin of net profit. But even more important to those dealers handling major appliances, he can create new users of traffic appliances—and new prospects for major appliances at the same time. It's like eating your cake and having it, too. Instead of *costing money* to get major appliance prospects, the dealer gets his prospects and *makes money* while getting them. He can attract thousands who are interested in these varied low-priced products as against hundreds who are interested in and able to buy major appliances.

To do this, he must remember that traffic appliances represent $5.00 transactions and sell them that way. They will respond to the same kind of treatment that sells hats, dresses and silk stockings with which they are in competition for the homemaker's dollar.

Formula for More Sales

He must learn the two essentials to greater traffic appliance sales: (1) Display traffic appliances continuously. (2) Sell uses and benefits of traffic appliances continuously.

No matter what else is done to create want and desire, merchandise is not bought until it is seen. The more exposure the more sales is just as true of irons, sandwich grills, toasters and coffee makers as it is of stockings, candy, pocketbooks and neckties.

There is a smart way to display traffic appliances to take advantage of their natural appeal. Let's travel to an average retail electrical store. Isn't this about what we usually see?—In one window, an electric refrigerator polished until it gleams and *alone* in solitary grandeur for the world to see; in the other window, a washer and ironer. Each window is required to attract the passer-by on the strength of its appeal to the wants which the displayed appliance will satisfy.

Sales figures prove that these two windows, devoted to refrigerators and laundry equipment are of interest to twenty-one out of every thousand persons who pass them. These windows cost money . . . they are there to sell. How can they be made to attract more people . . . sell more merchandise? I suggest

Two essential elements in small appliance selling are fulfilled in the display shown here of the Potomac Edison Co., Hagerstown, Md. The appliances are displayed advantageously and the actual demonstration sells benefits and use value to the prospective user rather than product alone.

*Adapted from an address before the Fourth Annual Conference of the International Association of Electrical Leagues, in New York City.

Small appliances will create interest in a dealer's window. The single range shown below may constitute a most artistic display, yet sales figures prove that the addition of an assortment of small appliances will increase the stopping power tremendously. The window at the left will stop five times as many passers-by.

traffic appliances as the answer because . . . an attractive display of electric irons in the washer window will quardruple the effectiveness of this window. Why? Sales figures prove there are four times as many electric irons purchased as there are washers and ironers . . . four times as many people, therefore, will be interested in irons and a window showing them.

Let's go to the refrigerator window. A well-chosen assortment of table appliances in that window will multiply its "Stopping Power" by five. Proof is again found in the sales figures, so by using traffic appliances in these windows, ninety-five people out of a thousand can be attracted to them instead of twenty-one. Certainly, on this basis, the windows are better paying their way and a big plus will come in the increased sale of the traffic items by the retailer, who lets the public know he has these wanted items.

Let's go inside the store. If the retailer is going to change this interest in appliances into a cash register symphony, first attention must again be given to display.

Where to Display Them

The high traffic points within the store are where the traffic appliances should be. They should be out in the open where they can be seen, handled and uses demonstrated. Can the retailer afford to give traffic appliances this space? He can't afford not to—because again of the increased interest power of traffic appliances, and because three or four square feet of floor space devoted to traffic appliance display at the high traffic points inside the store will go a long way toward paying his total store overhead. It's been proved. We have a dealer whose traffic appliance display at the counter where people pay their bills nets him fourteen turnovers a year on a $200 stock investment; and it occupies less than three square feet of floor space.

To complete this simple selling formula, the dealer must sell uses and benefits of traffic appliances continuously!

A gold-plated waffle baker at any price is no bargain for someone who doesn't want waffles. Right now as Jack Frost is splashing the country-side with yellow, red and brown, the sight of a waffle—piping hot and done to golden brown perfection, crowned with a generous slab of slowly melting butter and covered to overflowing with maple syrup—makes an electric waffle baker a practical necessity. It shrinks the price tag of the most expensive model to virtual insignificance.

We all know this to be true, but in city after city and town after town, retailers are not selling enough waffle irons because they are not first selling *waffles*. They are not selling enough coffee makers because they are not selling the steaming aromatic fragrance of correctly brewed coffee as *only* an electric coffee maker can brew it.

They are *selling*—or trying to sell—price. Look in any newspaper. What do you see? If you see waffle irons or traffic appliances advertised at all the ad reads like this: "SPECIAL—TODAY ONLY —$5.95 Waffle Irons $4.69" or "COFFEE MAKERS AT CUT PRICES—$2.98, Regularly $5.00." Subscribe to a national clipping service as we have and check the ads for week in and week out and it's the same story. Effective? Yes —to a degree. Fourteen million traffic appliances were sold last year. User satisfaction and the experience of previous ownership has created a spontaneous demand. But how effective do you think *this* kind of selling is against the $5.00 hat, the silk stockings, or any of the hundreds of other places where Mr. and Mrs. Consumer can use what spendable surplus they have?

The answer is the want must come before the sale. When people want waffles they will buy a waffle iron with which to make them and not before. There must be no slackening of our efforts in selling the uses and benefits of traffic appliances.

I'm talking about more than advertising. The use and benefit story must be told in advertising and followed through in displays at the point of purchase and in the sales story told by the retail sales person. Whenever possible, these uses and benefits should be demonstrated. To get back to waffle irons again as example A. How many women do you suppose realize that a waffle iron has as many as forty-eight different uses? How much

(*Continued on page* 70)

Successful Home Shows

OVER forty thousand visitors were attracted to the National Home Show held recently in San Antonio and sponsored by the San Antonio Public Service Co. The man largely responsible for this annual event, which has proven so advantageous to appliance dealers, discusses some of the problems

By R. E. Sivley

Manager, Commercial Dept.
San Antonio Public Service Co.

DURING the past four years—1936 through 1939—the San Antonio Public Service Company, in cooperation with the architects, contractors, building supply dealers, real estate men, and the wholesale and retail appliance firms of our city, has sponsored a Home Exposition designed to bring together at one point all those activities associated with the building and furnishing of the home.

That these expositions have proven successful is shown by the willingness with which the majority of firms have participated year after year, and by the increased public interest and benefits derived.

Reflecting back over these years in an effort to determine what started these shows, there seems to be no one certain activity that might be credited with their origin. Instead, they are the result of a natural need and development.

When we discontinued the sale of appliances and turned our sales space over to local firms for timely display of their merchandise, it soon became evident that, while this plan had its advantages, it did not have sufficient interest to attain the results desired.

We had sponsored a mechanical refrigeration show in 1932, and we had participated in several radio shows. From our experiences with these events, we realized that by inviting more to participate, we would not only increase the interest in home building and home furnishing, but would increase the sale of appliances and reduce the costs to the exhibitors. Since our principal products are gas and electric power, any activity that would increase the consumption of these products and build up a greater interest in their uses was something to be given serious consideration. It was thus that the Home Exposition came into being.

R. E. Sivley, commercial department manager of San Antonio Public Service Co., right, discusses plans for their annual home exposition with E. A. Gauthier, his sales promotion manager.

The planning of one of these shows involves a tremendous amount of detail, and, since we are the chief sponsors, we do much of this work before calling a general meeting of those who, we believe, will want to take part. Records of previous shows are studied to determine those things that must be avoided; those things that have proven successful. We study the reports of our men who have attended similar shows in other communities, seeking ideas and suggestions that we may incorporate in our plans. We correspond with other show managers, and, in fact, do everything that will give us as wide a scope of information as is possible. Then we sort the wheat from the chaff, so to speak, and work out our preliminary plans. From and to these subtractions and additions are made until we have worked out a plan that meets with our approval.

In order that the reader may form a more concrete opinion on what is required in planning such a show, I am going to set down some of these details with a brief explanation of their purpose, value and importance.

San Antonio is fortunate in having a Municipal Auditorium, centrally located, and with an abundance of parking space, so the shows are held there. We found October the best month for this event. It not only results in some immediate business, enabling the dealers to move out current models of appliances, but paves the way for sales of new models when they are announced shortly after the first of the year. Home owners become interested in home modernization, and those who do

These views give some idea of the magnitude of the Home Show, which attracted over 40,000 visitors. Appliance dealers were particularly enthusiastic about results. In the first week following the exhibition, 1174 appliances having retail value of $88,000 were sold to prospects obtained at the Show.

Left, Mildred Hickman, of Hotpoint, presents a demonstration to several thousand women on Ladies Day at the Home Show. Below, Hon. Maury Maverick, mayor, addresses throng at official opening.

not own their homes become interested in the construction or purchase. In other words, it brings in some immediate business, sufficient to pay the cost many times over, and builds up a tremendous volume of possible future business.

The show continues through eight days, opening and closing on a Sunday. Doors are open at six o'clock p. m. and remain open until approximately ten-thirty. An admission price of 25 cents is charged. This is to secure a select crowd, and to keep out the riff-raff who come only out of curiosity or to get something free. Each exhibitor, however, is furnished with several hundred passes which he may distribute as he wishes.

The space immediately in front of the stage in the auditorium is so constructed that it may be cleared, levelled off, and used for display space. This is reserved for the appliance dealers. In the basement is a large, semi-circular lane approximately 40 feet in width—sufficient for booths on

(*Continued on page* 69)

New Appliance Improvements Lower Sales Resistance

IF somebody didn't build a good steady ladder for the fruit picker to stand on while he goes after the fruit at the top of the tree, he'd either fall off and break his neck, or take only the fruit he could reach from the ground. In either case, most of the harvest would be lost, and the orchard owner would take it on the chin. So it is with the major appliance salesman.

If research engineers and designers didn't provide a sturdy, dependable product upon which the salesman can "stand" with perfect confidence, sooner or later his "ladder" would buckle under him —and that would be the end of the appliance business, so far as he was concerned. Of course, the appliance retailer or utility sales manager would take the loss—not only in lost sales, but in excessive service and maintenance costs.

Only when he is on top of a good product, that combines the lowest possible price with product advantages including comfort, health, convenience, safety, better results, speed and pride of ownership, can the appliance salesman hope to make a living for himself and a profit for his employer.

Fortunately for all of us in this business, engineers who are setting the pace in the development of modern electric ranges, refrigerators, water heaters, dishwasher sinks, and home laundry equipment, know these things. The major improvements in 1940 lines of kitchen and utility room equipment are solid proof of it. The haphazard, guess-at-it method of appliance development and cost reduction is as extinct today as the "dodo," and we confine the analogy to these pace-setting appliance engineering groups.

As salesmen see these beautiful new products for the first time, and learn their new features of performance and convenience, as presented by reputable manufacturers, they seldom realize that years of painstaking development, research, and testing are reflected in each improvement, in order that these features, which make appliances easier to sell each year, will also embody the quality and dependability which make them "stay sold."

By W. F. Ogden

Commercial Engineer, Edison G-E Appliance Company, Inc.

Probably the most outstanding example of increased saleability of electric ranges, by way of intensive practical research and engineering, is found in the enclosed electric heating unit. Several years ago, heat output of flame fuel burners was increased. Electricity was forced to prove it was just as fast a cooking medium.

Increased Cooking Speed

This increase in the speed of electric cooking units had to be accomplished without increasing the *cost* of cooking electrically. For an explanation of how this was done, we must look deeper than the rating on the nameplate. The time to boil one quart of water has been reduced by about 46 per cent. The unit isn't used on high heat as long as it used to be. About fifteen minutes were required on the old 1000-watt open coil unit of years ago, compared to less than eight minutes for the 1300-watt Calrod unit of 1939—seven minutes saved, and about 31 per cent in energy—which seems to have favorably affected range load characteristics.

Lower surface unit heats, now so common, have cut the wattage —and watthours—used after the boiling point is reached for many cooking operations. Low heats used to deliver 250 to 300 watts—with 1939 units, they delivered 80 and 160 watts. This part of cooking constitutes about 30 per cent of the total cooking job. Energy consumption is reduced, and so is demand on electricity supply facilities.

Don't overlook the improvement in load unbalance which the 230-volt heating element of these surface units brought about. The neutral is only used on the two low heat switch positions supplying 160 or 80 watts, whereas 600 watts for medium heat were formerly supplied through the neutral. In the 2100-watt unit, the proportion is the same, and wattage being larger, it means that much more.

This unit established the electric range with the closed unit as a fast, long-lived, thoroughly practical appliance. Nevertheless, engineers and salesmen knew that it couldn't stop there. To continue making the electric range easier to sell, year after year, all these improvements in speed and economy must be bettered—and costs reduced, without sacrificing quality. The result is seen, for example, in one of the new 1940 units. The development program on this unit has been under way for many years. Out of it has come a unit which performs a *better* cooking job than the old unit, but does it faster and cheaper, and has a *lower* nameplate rating!

In recent years, ovens have also been improved. They are about twice as fast to preheat, and more efficiently designed, with far greater use value. The truly modern oven provides excellent cooking results by the efficient energy and time-saving cold start method, as well as by the preheated start method. Preheat and broil wattage input, while now high by comparison with past practice, probably won't increase. Ranges using other fuels are far from matching the speed and economy of these operations. Further improvements

most likely will come from design changes . . . improvements based on oven research and the wealth of experience we now have as a background.

Accurate rating of all heating elements — a result of E.E.I.-N.E.M.A. joint agreement—is already having a helpful effect in coordinating range performance with utility problems on energy supply facilities and utility installation and service practices. These things all spell progress.

Mechanisms for oven doors, wiring, et cetera, have likewise undergone improvement, but that which we know means even more to sales and service men, is the vast improvement recently made in porcelain enamel. Through four main changes, field service reports show us that chippage complaints have been reduced in number to *less than one-third of what they were only a year-and-a-half ago.* Engineering records at the factory, comparing old with new models; i.e., hang-on panels versus new one-piece body design, show the improvement to be better than 90 per cent, indicating that *troubles are one-tenth of what they were.* Field service records will soon show the same vast improvement.

The four reasons are:

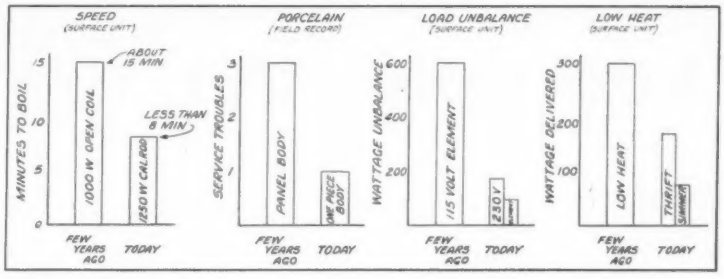
(1) The rigid, one-piece, all-welded range body.

(2) Scientifically measured and reduced thickness—from about 0.62 in. maximum to 0.025 in. maximum, with the average about 0.014 in.

(3) Improvements in material, its processing, application, and firing.

(4) Improvements in crating and shipping.

The control of color is also scientific. Matching is done by a reflectometer rather than by the human eye.



The tremendous improvements made in electrical ranges in the past few years are illustrated graphically in this chart.

Turning attention to water heaters, we should consider piping. Most service men are now using copper tubing with economy and improved hot water service. Georgia Power Company, I believe, has found an answer to syphoning and pipe-freezing troubles, through the use of a three-way anti-syphoning valve described in ELECTRICAL SOUTH by Allen Parker some months ago. The importance of efficient location using the smallest pipe-size possible, and discarding the furnace coil, are old improvements which all now practice.

New improvements incorporated by manufacturers in their new lines will make selling much less difficult. Such improvements as the greatly increased cooking speed will supply the salesman with splendid material for replacement sales.

Standardization in all phases of electric water heating is on the way. Electric water heating will enjoy a big boost when that day arrives. It's not so far off. There lies lower manufacturing and warehousing cost, lower cost to serve, increased profit possibilities, and greater customer satisfaction.

Turning to reductions in water heater installation and service costs, we find both have been low. Both will go lower. Water heater units, like range units, are better. The same knowledge and development program applied to one goes into the other. Dielectric strength is greater than it was, by a considerable margin. Voltage surges are now resisted which formerly caused failure. That's only one improvement. There are many others that have been made, and of course there are more to come. Electricity inherently lends itself to these rapid improvements. It's the nature of the stuff!

The all-electric home, we discover, requires ensemble planning for all of the major appliances. In the simple matter of hot water, we find a tie between the dishwasher and water heater.

This new dishwasher is an important infant in the family of

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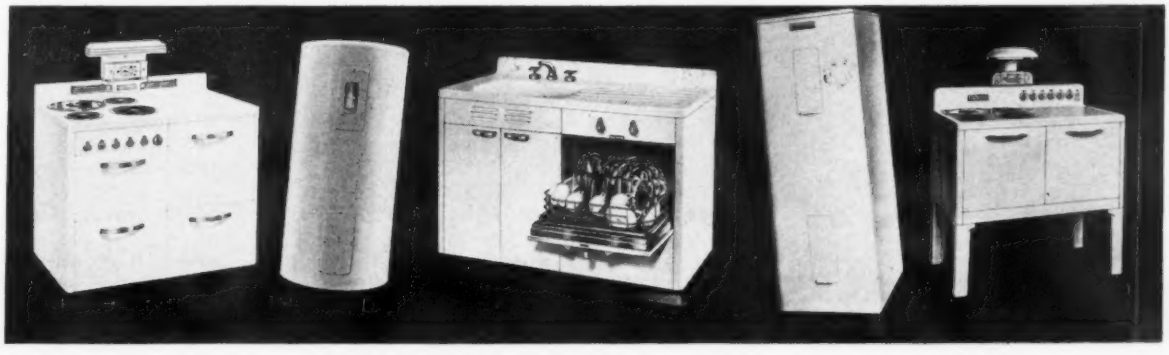


Adequate Wiring —

Sales executives compare notes in New Orleans on local plans

A VARIETY of approaches to the adequate wiring promotion problem were described at the Southern Regional Wiring Conference held in New Orleans, December 7 and 8, where more than a hundred representatives of the electrical industry of the South gathered to compare notes on their adequate wiring programs.

Enthusiastic endorsement of the National Adequate Wiring Bureau's program was voiced in the round table discussions that occupied the four sessions of the conference. Delegates were in agreement that the program gave the industry, for the first time, a promotion of mutual interest to all branches of the industry; one that should prove valuable in welding the interests of the branches of the industry into unified local leagues and associations. Despite the broad nature of the program, discussion disclosed, local support has been dependent largely upon the utility companies.

Discussion indicated that local programs were placing principal emphasis on home wiring, but adequacy in commercial and industrial wiring were discussed. Several delegates expressed the opinion that expansion of the program into these fields would greatly simplify the problem of interesting the large electrical contractors in local programs.

D. E. Clement, chairman of the adequate wiring committee of the Electrical Association of New Orleans, opened the conference and introduced Rudolph Viener, Jr., president of the Association, who welcomed delegates to New Orleans and pointed out that the Association could serve appropriately as host to the conference, since adequate wiring had been its chief activity during the past year, as it would be in the ensuing year. Assisting Mr. Viener as co-chairmen of the various conference sessions were W. J. Amoss, general sales manager, New Orleans Public Service, and C. L. Osterberger, general sales manager, Louisiana Power and Light Co.

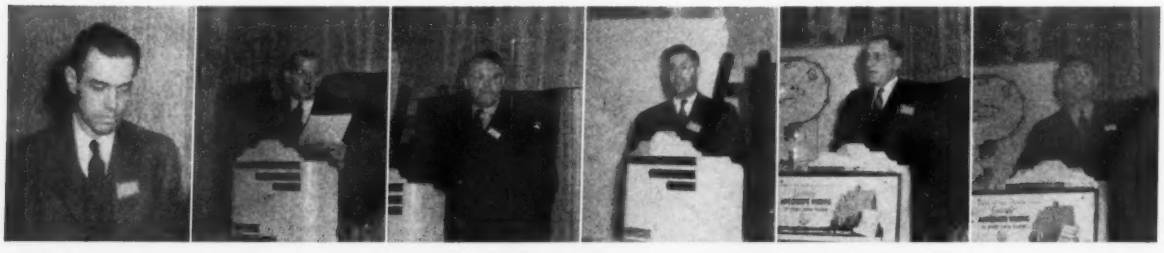
New Home Construction

The promotion of adequate wiring in new home construction was the first subject on the conference agenda with discussions led by Carson E. Hickox, sales development department, Oklahoma Gas and Electric Co.

Mr. Hickox reviewed his company's experience in promoting "Reddy Kilowatt" adequate wired homes—a promotion planned and begun before the national program had been initiated. Principal feature of the plan was an advertising allowance made available to speculative builders, who followed the company's "Reddy Kilowatt Home" specifications as to wiring and lighting. The advertising was required to carry the symbol designed to identify homes meeting these specifications. During inspection periods, homes were further identified by outdoor signs; and numerous placards were used throughout each home to point out the specific advantages of various outlets and fixtures.

"This program accomplished three things for us," Mr. Hickox explained. "First, it made our customers conscious of the need of better lighting and wiring, and made home prospects ask for houses which were correctly wired and lighted; second, it made the builder conscious of better wiring and lighting and when he once started building Reddy Kilowatt wired homes, he continued to do so; and the third result of our Reddy Kilowatt wiring promotion was the awakening of the electrical contractors, the Oklahoma City building department, and others, to the need of a revised wiring code in Oklahoma City. Consequently, at the first opportune time, which was July, last year, our wiring code was revised so that now No. 12 wire instead of No. 14 is required; a definite number of receptacles are necessary; and a reasonably satisfactory number of circuits are mandatory.

"Although our new code is far from perfect, we feel that it is a great improvement and it conforms closely with the National Electric Code. They are still building hundreds of homes each year in Oklahoma City, but we have discontinued our Reddy Kilowatt promotion because we feel at this time



Among those who led the discussions were, left to right, C. E. Hickox, Oklahoma Gas & Electric; J. T. Tuohey, Arkansas Power & Light; H. E. Meade, New Orleans Public Service; E. A. Gauthier, San Antonio Public Service; E. N. Avegno, New Orleans Public Service; B. F. Martin, Tennessee Valley Authority; and Norman Tindal (not in photograph) of Duke Power Company. Nearly every delegate participated in the general discussions.

Ten Southern States Represented at New Orleans Wiring Conference

Nearly every southern state was represented at the Southern Regional Wiring Conference held in New Orleans, December 7 and 8. Upper left: W. J. Amoss, New Orleans Public Service; H. E. Braunig, Gulf States Utilities; J. S. Sutherland, Alabama Power; and A. C. Tait, Nat'l Adequate Wiring Bureau. Upper right, W. E. Clement, New Orleans Public Service; O. C. Small, Nat'l Electrical Mfgs. Assn.; R. Viener, Jr., Philips Elec. Const. Co., and past president of Electrical Assn. of New Orleans. Small photos in center: Mr. Amoss and C. L. Osterberger, Louisiana Power & Light, co-chairmen of the conference; and Mr. Clement, general chairman of local arrangements. Center, right: J. S. Sutherland, Alabama Power, and George Segel, secretary, Electrical Assn. of New Orleans. Lower left: Herbert Dorrill, Houston Lighting and Power; C. E. Hickox, Oklahoma Gas & Electric; and A. J. McCall, Graybar Electric. At lower right, E. A. Gauthier, San Antonio Public Service, stands beside his demonstration board.

that with the new code in effect ing adequacy in new homes has there is no need of continuing this program."

A similar plan to promote wir- been in operation for eight months in Charlotte, N. C., according to Norman Tindal, of Duke Power Co., and secretary of the Charlotte Adequate Wiring Bureau. The Charlotte plan provides an advertising allowance of one per cent of the sales price of a home to the speculative builder who incorporates the Bureau's wiring stand-

ards in his homes. Principal variation from the Oklahoma promotion is that allowance is made by the Bureau instead of the local utility company, and that advertising copy is supervised. The advantages of the latter requirement were emphasized by tear sheets displayed by Mr. Tindal, showing ads in which the comfort, convenience and safety of adequate wiring were featured, particularly.

P. M. Rutherford, of Dallas Power and Light Co., pointed out that the greatest single factor contributing to the promotion of adequate wiring in new homes in Dallas had been the recognition of this feature by the local F.H.A. office in its loan appraisals. Operations in Dallas have been promoted by an industry committee, and a considerable sum has been expended in advertising to sell the adequate wiring idea to the public.

Direct contact with architects has been the principal means of promoting wiring adequacy in Houston's new homes, reported D. F. Painter, Jr., of Houston Lighting and Power Co. To facilitate this work, the company is about to release an "Adequate Wiring Manual" designed to suit local conditions. The manual will include 14 complete wiring plans and specifications for homes valued at from $4,000 to $20,000, in addition to a sales story on the advantages of wiring adequately.

$6000 for Wiring Promotion

Commenting also on the wiring promotion in Houston, Herbert Dorrill, sales manager of Houston Lighting and Power Co., pointed out that the company had circularized every one of its 129,000 domestic customers with an adequate wiring folder, had utilized nearly sixty billboards, and had expended more than $4,500 in advertising in 1939. The 1940 advertising budget, he said, would include approximately $6,000 earmarked for adequate wiring promotion.

The discussion of wiring adequacy promotion in existing homes was led by J. T. Tuohey, commercial sales manager, Arkansas Power and Light Co., who opened the session with a description of his own company's activities in this field. Pointing out that much of the area they served was rural, and that the majority of the prospective customers are in the lower income bracket, Mr. Tuohey stated that the problem of obtaining wiring adequacy along rural lines had been solved to a great extent by promoting the use of CNX cable for house wiring; and by developing a plan whereby prospective rural customers could work for the utility company on rural line extensions until they had earned amounts sufficient to cover costs of wiring and meter deposits.

CNX Used Successfully

Supporting the use of CNX cable for general house wiring, Mr. Tuohey stated that 2,257 homes in his territory have been wired with this product since 1935; that contractors making the installations had reported savings in labor amounting to approximately 51% over conventional wiring methods and savings in materials of 22%; that not a single fire or case of trouble had resulted to date; and that the lower cost of installation together with the "customer work" plan had resulted in much more adequate installations than might have been attained otherwise.

The F.H.A. financing plan for electrical wiring was cited by C. O. Carpenter, Jr., sales promotion manager, Knoxville Power Board, as an incentive to local electrical contractors, stimulating them to promote rewiring in existing houses. One contractor used salesmen to solicit rewiring jobs and in a short time had sold 24 jobs. Of particular interest, in connection with this effort, was the fact that although the easy terms of the F.H.A. financing plan were used as a sales incentive, only two of the 24 jobs sold were financed in this way.

The convenience and sales possibilities through such financing plans were further discussed by representatives of both the Commercial Credit Co. and the General Electric Contracts Corp., present at the conference.

Adequate wiring promotion through industry cooperation was the topic of discussion led by H. E. Meade, vice president, New Orleans Public Service. He emphasized that the entire industry was concerned with this program and expressed the opinion that this conference should result in material that would form the basis of an "industry plan" for adequate wiring. He suggested that the industry should capitalize to greater advantage the tremendous publicity given the idea of "electrical living" through TVA and other federal projects.

How industry cooperation was helping to promote adequate wiring in New Orleans was explained by George Segel, secretary of the Electrical Association of New Orleans. The adequate wiring promotion was the first activity, he said, which appeared to interest all members of the Association. It was started in a modest way by simply spending $7 each Sunday for a classified ad carrying the seal of the Association and featuring the phrase "adequate wiring." The small advertisment brought many inquiries from prospective home owners and builders. As the promotion gained impetus, mailing pieces were made available to Association membership, and all inquiries were followed up by home service girls. The Association promoted adequate wiring effectively through the New Orleans Home Show and sponsored two adequately wired homes for public inspection. In all, approximately $1,500 was expended on this activity this year and considerably more is expected to be made available to carry on this work in 1940.

Municipalities Represented

Considerable interest was exhibited by the conference in the attitude which the municipally owned electrical systems would take toward local electrical associations and adequate wiring promotions. Several representatives of such systems were in attendance, among these being T. F. Dohogne, of Memphis; C. O. Carpenter, of Knoxville; C. B. Osborne, of Chattanooga; and B. F. Martin, of the Tennessee Valley Authority.

All of these representatives indicated that their systems would ccoperate with local organizations insofar as possible and some of them reported that their companies had already taken out memberships in local leagues. There was no indication, however, that these systems would find it possible to support local promotions financially to the extent that the private companies had aided them.

Mr. Carpenter pointed out that he was endeavoring to get a league organized in Knoxville, and that he had promised to put a man full time on adequate wiring promotion if the local group would adopt a long range program. Mr. Osborne said that the entire Chattanooga electrical industry was expected to turn out for a league meeting December 11 which would feature the subject of adequate wiring.

Representatives of several companies reported that industry cooperation was being obtained principally through a small guiding committee with two or three members representing each specific branch of the industry. These organizations were found particularly suitable for those cities which have never had an active, organized league or association. Among the cities having such "committees" are Dallas and San Antonio.

One of the high lights of the conference was the very searching analysis of the wiring promotion problem from the piewpoint of the utility company, presented by E. A. Gauthier, of the San Antonio Public Service Co.

Problem Analyzed

Recognizing the value of the National Bureau's program, Mr. Gauthier said his company carefully analyzed the local situation to determine what the probable response would be to a local promotion.

"Here is just how the situation looked to us," he said.

"1. The public generally is not tremendously impressed with the advantages of adequate wiring.

"2. The architect is only passively interestted because the lumber yards and small architects do 90 per cent of the residential work.

"3. Realty and speculative builders are lukewarm in interest.

"4. The residential electrical contractor thinks it is all right if the architect, builder, or someone else will specify the adequate wiring system; and, parenthetically, he still clings to the false idea that he will get the additional outlets required as extras.

"5. The larger electrical contractor sees in the program a new source of life for the curb-stoner and small contractor, and a new opportunity for the latter group to cut deeper into business which should accrue to the larger contractor.

"6. The utility and electrical jobber are the only group who have and will continue to spend any important money on the promotion of the local programs.

"These problems have been attacked along all fronts, and progress is being made," Mr. Gauthier said. "Each group has been treated as a unit, and the approach planned to meet the situations and objection of each. Experience has, for the most part, dictated the treatment of the subject matter and type of presentation of the program to such groups." Mr. Gauthier then presented a detailed description of his companies approach to each of these different groups; of the subsequent organization of a local "Adequate Wiring Committee" and adoption of a certification plan; and of the one hundred per cent increase in outlets experienced in the first certified homes.

Sell Advantages of Plan

In connection with the promotion of adequate wiring by utilities, W. J. Amoss, general sales manager, New Orleans Public Service, pointed out the need for selling the contractor, architect, and others of the industry on the advantages of a program, regardless of how obvious the merits of such a promotion may be to the utility personnel.

For a long time, he said, our company had been offering contractors assistance with commercial lighting layouts and similar service. Yet the response to these offers was not great until the company began to look at these problems from the contractor's viewpoint and recognized that he had not been sold on their importance. A careful campaign along this line has produced splendid results.

The promotion of adequate wiring through close cooperation with electrical inspectors; through special home promotions and home shows; and through cooperation with mortgage, insurance, building and loan associations and Federal agencies, was the subject of discussion led by E. N. Avegno, manager of dealer sales division, New

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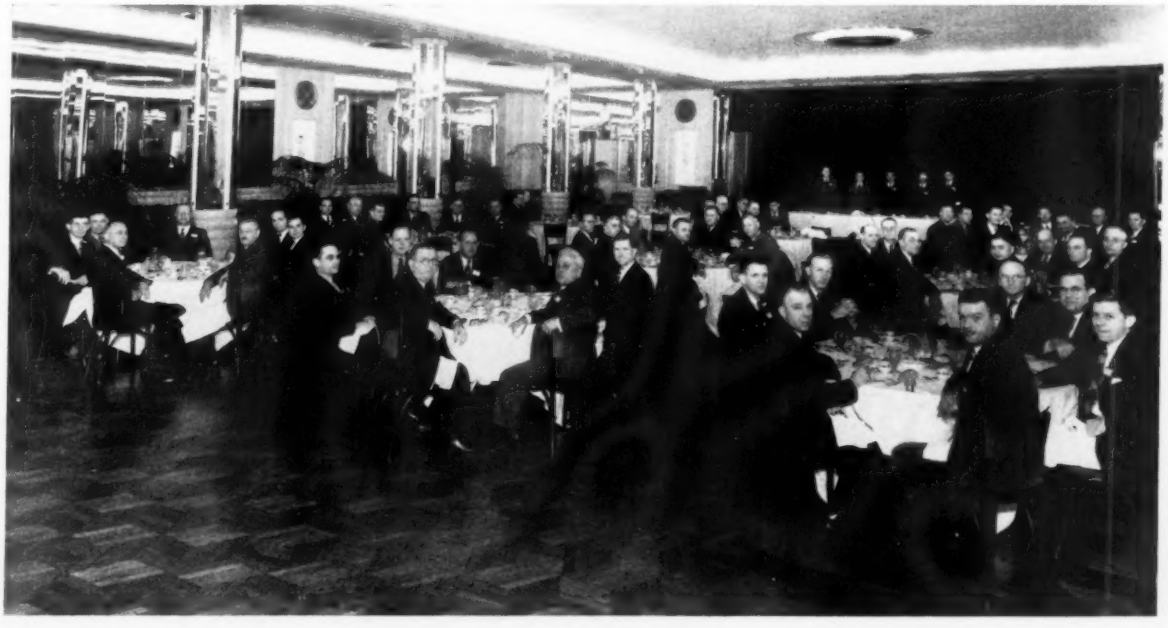


O. C. Small, manager of NEMA's business development department, addressed the conference at a luncheon.

Labor Shortage Forestalled By Apprentice Training

By Randall Scott

ONE of the chief ills of the electrical contracting industry in many points throughout the South has been found to be a shortage, either present or imminent, of skilled, adequately trained electricians. In many cities, the ranks of skilled workers are thinning from year to year as electricians pass from the active age, or go into other fields, and no adequate steps are being taken either by industry or union to raise a new crop of workers to replace them.

Some cities have no apprentice system at all: others have systems which are unsatisfactory, wherein youngsters may become apprentices without a proper background, may serve their apprenticeship doing nothing more educational than acting as flunky for a journeyman, and may become classed as journeymen without half the proper training.

One city in which such a situation does not exist is Louisville, Kentucky. In Louisville, an apprentice training system has been in operation for many years which ensures three major essentials: first, that only young men well suited for electric trades will be allowed to prepare for apprenticeship; second, that they will serve a suitable apprentice period before being classed as journeymen and that their apprentice education will be first rate; and third, that their period of apprenticeship will be an extension of their education rather than a period of running errands and carrying tools, so that when they become journeymen, they will be able to do the job as a journeyman should be able to do.

A careful balance is maintained between the number of candidates who are educated and the number of probable vacancies in the industry, so that supply nearly always equals demand, with the slight preponderance being in favor of candidates versus jobs, so that jobs in the industry are always sought after, but that no unemployment of any consequence exists within the ranks of skilled workers.

The hub of this system is the Ahrens Trade School. This school, organized in 1916 as the Louisville Vocational School, was re-named for the late Theodore Ahrens in 1926 when he gave it a substantial endowment. The trade school is conducted by the board of education and is the only one of its kind in the city.

There are trade schools in most cities, however, and they don't always produce the ideal conditions which exist in Louisville. This has come about by careful planning, cooperation and work between the school board of control, the electrical industry, and the electrical union heads in the city.

The Training Schedule

A three-year course is offered at the Ahrens school. Boys spent 15 clock hours per week in the school shop and two periods per day in studies of the science and mathematics of electricity. Before entering the regular course in electricity, the applicants have to spend five months in a preparatory course, the purpose of which is to determine aptitudes. Those who show little aptitude for electrical work are directed to other trades: it is here that the wheat is separated from the chaff, so that only first rate material gets into the actual training procedure.

The courses in the school are based on the electrical code of Louisville, fundamentally embracing all necessary principles and applications of electrical practice, but going farther than elementary instruction in specifically following the requirements of the industry as it is practiced in Louisville, so that the courses are practical as well as theoretical. The courses are changed and revamped year by year, to keep abreast of any changes in the code and current electrical practice. Examinations are prepared and conducted under the supervision of the Board of Control, composed of a representative of the contracting industry, a representative of the city, of labor, and of the utility. They are appointed annually by the city director of works. Present members are George H. Miller, Louisville

The Ahrens Trade School is the hub of the successful vocational training and apprenticeship plan operated in Louisville.

Gas & Electric Co., H. H. Hudson, business manager of the local union, Harry J. Anderson, contractor, and Harry H. Hummel, assistant manager of the Kentucky Actuarial Bureau.

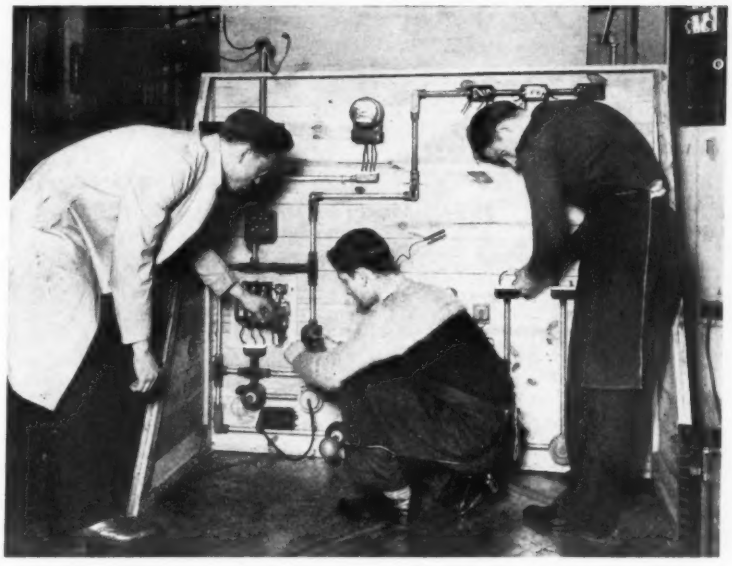
By way of avoiding the possibility of overcrowding in the field, the enrollment is limited to 25 to begin with; by the time the misfits have been weeded out, only a few top-grade apprentices are turned out to fill a corresponding number of vacancies in the trade. In June, 1939, eight boys were graduated. The extent of the union's and industry's cooperation is seen by the fact that six of them were snapped up within two months. The average graduation each year is about the same. Herbert Hudson, secretary of the local union, is a former Ahrens student.

The thoroughness of the school's job is illustrated in the automatic solution of the problem felt in other localities of workers' deserting the field for other occupations. A recent survey conducted by the school revealed that 95% of its graduates had remained in the electrical industry over a five year period studied.

Plainly, while the Ahrens school is doing an outstanding job in its own right, it alone could hardly have solved the personnel problems of an industry without the hearty support, cooperation and assistance of both labor and industry leaders. Those factors have been forthcoming from both sources, in order, from the union's standpoint, to see that a satisfactory supply of good electricians continues to exist in Louisville, and at the same time to see that the field does not suffer from unemployment overflow.

From time to time representatives of the industry, contractors and successful electricians, are invited to address the apprentices in the school, and to discuss the training procedure with the instructors. This keeps the practical side of the future constantly before the apprentice-candidates, not letting them lose sight of their practical goal in the theoretical atmosphere of the class-room.

Industry extends another helping hand when apprentices are graduated and placed by the union, which makes every effort to place the properly trained apprentices in the best places. Instead of using apprentices as mere waterboys or lackeys, they are placed side by side with the experienced electrician, whom they serve as helper, and thus learn practical application of what they were taught in the school. This procedure is at variance with that in some localities, where contractors hire only the number of helpers required by the union regulations, and then take no time or effort to instruct them in practical work. On its part, the union is very cooperative in arranging the number of helpers to be placed on a job in a manner to fit the nature of each case.



The practical side of electrical training for these young men, who will soon be apprentices, is not neglected.

When an apprentice has served his four years of apprenticeship, he is fully and practically qualified to obtain employment as a journeyman. Neither through his apprenticeship nor after his qualification as a journeyman, however, is his education permitted to cease. The school offers a night course twice weekly for electricians who wish to keep up to the minute in their trade as they continue to practice it.

Local Code Studied

Last year a course was offered in a study of local codes in comparison with national codes, and also an extension course in mathematics. There is also a discussion class for journeymen in mathematics and science; held flexible in nature so as to be adaptable to the problems of the trade, and devoted to practical applications of the subjects to daily problems. The school is further available for the extension of part time instruction of any employer's employee group or apprentice group.

The union furthers this post graduate education by recommending that journeymen attend the classes, and furthers apprentice education by requiring that apprentices in service attend the night classes for journeymen.

Examinations are comprehensive. They cover subjects of plain house wiring, sign wiring, lighting, motors, generators, power wiring, and thence into specialized subjects such as radio, illumination, and similar branches of the field.

No practical tests are given; a careful record of the teachers' observations of students in the practical side of the instruction period is deemed to replace a laboratory side of the examinations, since true aptitudes and tendencies are more likely to manifest themselves in ordinary daily routine of school work than when the applicants are under the stress of an examination. The city's regulation is that no boy may act as apprenticed helper under the age of 16; this is entirely in line with the school's three-year course, which, taking applicants at an elegible age, usually graduates them at the average age of 18, well over the requirement, and sufficiently mature to

A*Continued on page 67)*

Space Heating Electrically

Careful analysis of all costs and benefits indicates that electrical heating is practical and economical.

By Warner Ogden

IN years to come, the Knoxville home of Max Reich may be pointed out to passers-by as the "first all-electric home in Knoxville." Heated electrically, as well as being equipped with practically every electrical home appliance, the recently completed residence sets the pace for the "homes of tomorrow."

The Briscoe Electric Company, of Knoxville, headed by W. E. Briscoe, wired the 13-room, modern brick home, which presents a specific example of future possibilities in an ever widening field for electrical contractors and dealers. Already several other homes are under construction in Knoxville which will include electrical heaters as their only source of heat.

Electrical heating equipment was not installed in the Reich home as a publicity stunt for the house was first designed for a conventional central heating plant utilizing coal fuel. The decision to heat the house electrically was reached by Mr. Reich only after he had been sold on the advantages of electrical heating and had been shown careful estimates of the heating cost for an average winter.

The total consumption and cost of electricity on the Knoxville rate for this home, which includes thirteen rooms, was calculated at appraximately 21,000 kilowatt-hours, amounting to $133.75. This estimated cost was divided as follows:

Month	Kwh.	Cost
October	840	$ 3.35
November	2940	18.50
December	4662	31.50
January	4935	33.50
February	4116	27.40
March	2625	16.00
April	822	3.50
Total	21000	$133.75

In his home, Mr. Reich also installed a range, water heater, refrigerator, modern lighting system and small appliances, which consume approximately 400 kilowatt hours per month, at a cost of $6.50 per month, or $78 a year. The total cost, including heating and all household uses, is estimated at $211.75 per year or around $17.65 a month.

The wiring installation cost was approximately $240. Each heater was connected to a separate 230-volt circuit. Other details of the installation were: 200 ampere main line switch; No. 3/0 service entrance conductors, 18 No. 10 heater circuits; an 18 circuit panel for heating control; a range circuit; and a water heater circuit. The list price of the electrical heaters installed was $700.

Outside walls and space over ceiling are insulated with four-inch rock wool. A playroom, maid's room, bath room and basement have ½-inch of insulating board.

This 13-room home, recently completed, is Knoxville's first truly all-electric home—it includes electrical space heating as well as practically all other electrical household appliances.

All heaters used are the wall type, with the exception of heaters used in the maid's room, upstairs bedrooms and bath, which are portable heaters.

Estimated operating costs include heating for the entire house for 14 hours a day. Heating cost is expected to be reduced to $100 a year through careful operation.

Advantages of electric heating are that each room can be heated separateiy, as each heater is thermostatically controlled. Temperatures can be regulated exactly by this control. Redecorating costs are extremely low and less redecorating is necessary than in an ordinary home heated by other means.

Depreciation on these heaters and wiring is figured at one to one and a half per cent per year, as compared with 5 to 10 per cent depreciation per year on furnace equipment.

In discussing the possibilities of electrical heating, C. O. Carpenter, Jr., sales manager of the City Utilities Board, said: "Some of the main arguments for electrical heating are the convenience, the even temperature at all times, the elimination of all carrying of ashes or coal. Another great advantage in electrical heating is that the cost of a basement can be saved if desired. The basement had been dug for the Reich home before the builders decided on electric heating, so the space was used for a recreation room and maid's room.

"The saving on a basement runs from $350 to $730. Other costs of installation, including wiring, were about equivalent to a furnace installation.

"Our previous experience showed that the diversity factor, especially on electrical heaters, runs around 50 per cent.

"Taking all factors into consideration, I believe electric heat is more economical than other types of heating if the house is well built and well insulated.

"We are very careful in recommending electric heating and do not recommend it unless it can be

(*Continued on page* 67)

The first large scale use of electricity for househeating in the South was in the town of Norris, Tenn. Here are some typical installations.

Understanding and Using the National Electrical Code

By B. Z. Segall

New Orleans Public Service, Inc.
New Orleans, Louisiana

THE supplementary rules relating to underground services are covered in section 2311 through 2314. The first three of these deal entirely with provisions for the protection of these services from mechanical injury. The last rule offers protection to the building from gases, etc., escaping into the building from the underground conduits.

Three methods are prescribed for protection of underground services from mechanical injury. First the cables may be installed in duct. This may be any one of the approved types of piping such as tile, concrete duct system, fibre in concrete, transite conduit, cast iron soil pipe, etc.

Secondly, standard conduit may be installed. It should be encased in a concrete envelop to protect the conduit from erosion.

Finally, an approved cable may be buried directly in the ground without an enclosing duct of conduit. Quite a few cables have been developed for this service by nearly all the cable manufacturers. Many of these have a synthetic covering which renders the cable moisture proof, acid-proof and alkali-proof in addition to having inherent protection to mechanical injury.

Mechanical protection for that portion of an underground service which is carried on a pole is required in section 2312. In most cases this is accomplished by encasing the wires or cable in a piece of conduit or well cleaned water pipe. The code only requires this protection for a distance of 8 feet from the ground. However, many ordinances require this pipe to be extended up the pole to a short distance below the pole line mains feeding the service. This improves the appearance of an overhead service connection considerably. Many approved type of cables which may be installed underground without being encased in conduit or duct should, in many cases must be, protected when extended on a pole.

In section 2313 are stated the rules for protection of the underground service entering a building. It should be noted that a service terminating in a conduit behind a switchboard will have its cables emerge from the ends of this conduit. If lead covered cables are brought out from the conduit lines, a standard conduit bushing may be installed to protect the cable from abrasion. However, an insulated bushing must be used if any other type of cable is used. This insulated bushing not only acts to eliminate abrasion but also gives added protection to the system by insulating the cables in case there is a failure at this point on the cable.

The sealing of the underground raceways where they enter buildings is required in section 2314. Most underground systems carry considerable amount of water and are often contaminated by gases. The gases have a very disagreeable odor and sometimes are dangerous.

Service Drops

The requirements for the service drop (the conductors from the pole line to the first point of attachment to the building) are stated in section 2321 to 2326 inclusive. Section 2321 was discussed in connection with 2302 in the eighth article of this series. (See December 1939 issue.)

IN this eighth article of his series on the Code, Mr. Segall continues his discussion of the requirements relating to services, covered in Article 230. Other articles in this series have appeared in foregoing issues, beginning in April 1939.

The minimum clearance of these conductors from buildings over which they pass must be 8 feet. A change has been recommended to recaption this section 2322 to read "Clearance of Service Drop" and add a new cross reference stating "For clearance above ground, refer to section 2325 and 7334." Section 2325 gives additional rules for clearance with respect to the height of the service drop at the point where attachment is made to the building being served. Section 7334 states the requirements for clearance from the ground for outside wiring in general.

Section 2323 requires supporting structures for conductors passing over a building to be independent of the building, if such a construction is practicable. Otherwise the supporting members if attached to the building roof must be a substantial structure adequately braced for wind resistance and loading stresses imposed on it by the wiring.

Section 2324 is a general safety requirement attempting to keep these conductors away from open porches, windows, etc. To make the rule more specific and applicable, a new sentence has been proposed for addition in the 1940 code. This new rule would require a minimum clearance of 30" from readily accessible windows, doors and porches.

The next section 2325, referred to above, requires that the point of attachment of the service drop at the building give a minimum clearance of 10 feet from the ground. For taller buildings it may be preferable to increase this clearance to 18 feet. However, it may be necessary to increase this in those cases where additional clearance is needed from other conductors, obstructions or locations such as railroad crossings.

This entire section 2325 has been recommended for revision. The new section would still establish a minimum 10 foot clearance above the ground. However, the rules would go further in requir-

ing minimum clearance of service drop conductors of 10 feet above sidewalks and 18 feet above driveways, alley and public roads. The maximum recommended height is changed to 30 feet.

This proposed revision of section 2325 recognizes the fact that in many cases it may not be possible to obtain the 10 foot height for the point of attachment, yet give adequate clearance to all surrounding structures. An unusually long service drop to a small cafe, soft drink stand or oil station set back on a lot far from a public road may give ample clearance from the ground at the property line if the point of attachment at the building is less than 10 feet. This new rule would require all conductors and connections to be properly insulated at all points within 8 feet from the ground.

The final section in this division states the requirements for the attachment. In general it may be stated that approved wire racks and dead end insulators are acceptable. It is required at present that a 12-inch clearance be kept between the wiring and projections of combustible materials, such as overhanging eaves, roof rafters, porch floors, etc. A revision has been recommended, deleting the entire section except the first statement requiring multiconductor cables to be attached to buildings by approved fittings. This would eliminate the rule for 12″ clearance, etc., stated above.

The next nine sections deal with the general requirements of the service entrance conductors—that part of the service wiring extended on or in the building from the point of attachment to the service drop to the service equipment. Section 2331 specifies the types of wiring permitted. It should be noted that four general methods are permitted.

1. Open wiring.
2. Approved entrance cable.
3. Wiring in conduit.
4. Wiring in electrical metallic tubing.

It is important to note that electrical metallic tubing is allowed only for circuits operating at 600 volts or less.

The fine print note recommends that automatic overcurrent protection be used at the service head if the service entrance conductors are to be installed in the hollow space of frame buildings. While this is but a recommendation, it would be well for contractors to treat this as a mandatory requirement, especially if service entrance cable or metallic raceways are to be used.

Changes in the Code approved by the Electrical Committee at its recent meeting will be discussed in an article scheduled for an early 1940 issue.

●

Section 2332 deals with the mechanical protection of the service entrance conductors. If protection is required it must be provided by the cable itself or by a metallic raceway. The type A.S.E. (armored service entrance) cable has a protecting armor and may be used wherever the conductors are subject to mechanical injury. Type S.E. (service entrance—unarmored) cable can be installed if the conductors will not be subjected to mechanical injury.

This section also provides that open wiring or unapproved service entrance cable must be installed so as to be eight feet or more above the ground. If the service entrance conductors are to extend on the building to a point closer than eight feet, then they must be enclosed in a metallic raceway. Type S.D. (service drop) cable is not approved for service entrance conductors but may be used if enclosed in conduit or electrical metallic tubing.

The installation specifications for open wiring exposed to the weather are stated in Section 2333. The proposed 1940 code revisions provide for some changes in these requirements. It has been recommended that brackets be spaced every six feet instead of nine feet. It has also been proposed that the spacing between conductors be decreased from six inches to three inches for the spacing of brackets on 6 foot centers. In the case where brackets are spaced on fifteen foot centers or less, it has been proposed that the minimum spacing between conductors must be not less than four inches instead of twelve inches as now provided for in the code.

Section 2334 states the wiring specifications for those conditions where the service entrance conductors are not exposed to the weather and are run as individual conductors. An addition has been proposed for the 1940 Code stating that there must be at least a 2½ inch separation between these conductors.

Where the individual conductors enter the building, it is important that they be brought in so as to keep moisture from flowing into the building over these wires. Section 2335 requires each conductor to be enclosed in an insulated tube. This tube must be non-combustible and non-absorptive (such as porcelain) and the tube must be installed so as to slant inward and upward into the building wall. As a final precaution, drip loops must be formed on the conductors just before they enter the tubes.

Section 2336 deals with the installation for service entrance cables. It should be noted that type S.D. cable must be mounted on insulators if used for the service entrance conductors on the building. The 1940 Code revisions propose to delete the last sentence providing a 15 foot maximum supporting distance for approved service entrance cable (Types S.E. and A.S.E.).

As a further precaution against moisture entrance into a building by means of the service entrance conductors, section 2337 provides that a rain tight service head be placed over the raceway or service cable or that a properly formed gooseneck be made in the cable. The cable may be run continuous from the pole to the meter or service equipment without the use of the service head or gooseneck as such construction would be inherently rain tight. A proposed change for the 1940 Code would make it mandatory to use a fitting properly supporting the gooseneck at a point near the connection to the service drop conductors. This would definitely tend to improve the mecahnical strength of the connection at this point. Drip loops are required, of course, at the service head.

Section 2338 makes it mandatory to have the metallic raceway rain tight if this raceway is installed where it will be exposed to the weather. This is required as a protection to the rubber covered wires within the raceway.

The requirements for bringing in the service entrance conductor raceway or cable to the service equipment are stated in section 2339. In general no live parts should be exposed except in the case of a switchboard. The entrance behind a switchboard must be made as outlined in the discussion of section 2313 on underground services.

APPLIANCE Service

Taking the Mystery out of Refrigeration Superheaters

By Allen Parker

WHEN we service engineers hear the word "superheat" used, most of us have a tendency to shun the discussion, because there is a feeling that the word is primarily for the use of highly technical refrigeration engineers and that the subject will soon be over our head, and may expose our limited knowledge on the subject. This may be true, but I believe that it will be easy for you to familiarize yourself with the principles involved by the term superheat and thereby acquire a knowledge that will be invaluable to you in your every day work on refrigeration expansion valves and cooling coils.

Superheat, briefly defined, is the heat that has been added to an evaporated refrigerant to raise it to a given temperature above that at which it evaporated. A refrigerant when first evaporated is dense and heavy and is known as saturated gas. As heat is added, it continues to expand and becomes thinner and dryer, and number of degrees temperature it has been raised above that at which it evaporated is known as degrees of superheat.

A common every day example would be a cooling coil with gas being expanded into it at 20 degrees and leaving the coil at 30 degrees. Thus, it would be operating with a 10 degree superheat.

All thermostatic expansion valves are set for operation at a certain number of degrees superheat, usually at 10 degrees. This means that between the point of expansion (needle seat) and the power bulb, which controls the operation, there will be maintained a difference of 10 degrees.

This statement is correct for practical purposes. Of course, if absolute accuracy was attained in making the superheat test as mentioned above, it might be found that the expansion valve power bulb was actually operating at a temperature above that of the refrigerant gas flowing through the suction line to which it was attached, because the greater amount of exposed surface of the power bulb would cause it to warm up from the surrounding air faster than the suction line, with the result that the superheat might be half of what it was intended to be. However, this does not present a serious problem, as there is always resistance in all coils and therefore to get a full flow of refrigerant, the coil will be operated at a somewhat lower temperature and pressure than that at which the expansion valve closes and this very nicely offsets the loss of accuracy at the power bulb.

One of the superheater "tee" fittings which may be used in the field to construct a superheater. This tee permits the liquid line to be located inside of the suction line for a short distance.

The capacity of an expansion valve or coil is definitely determined by the superheat at which it is operated. Some really serious mistakes on large jobs may be attributed to the service engineer's disregard of this very important consideration. The reason is that superheated gas flowing through a coil is necessarily operating at a higher temperature than saturated gas. This reduces the difference in temperature between the gas and the air flowing around the coil, thereby reducing its capacity to absorb heat. Maximum capacity is never obtained from a coil unless it is operated with saturated gas throughout. This is not practical unless a dryer coil or heat exchanger is used, which is to say that a coil operating at maximum efficiency and capacity would be operating throughout with saturated gas and there would be zero degrees superheat at the end of the coil. Most manufacturers base the rated capacity of the coil upon operation at 10 degrees superheat.

It is interesting to note that in order to change the capacity of a condensing unit and yet retain the same coil with the same capacity it is necessary to change the superheat. As an example of this, consider a continuous tube brine coil 100 feet in length which is refrigerating a brine bath. As with most coils, and as per the setting of most expansion valves, it is operating at 10 degrees superheat on a condensing unit of 10,000 btu per hour capacity.

It is easy to see that if all the coil is being utilized, then there would be a heat transfer of 100 btu per hour per foot of coil. Again, as an illustration, assume that in order to maintain the correct brine temperature, the refrigerant must evaporate at 15 degrees lower temperature. With a 10 degree superheat, you could expect evaporation to take place in all but the last few feet of the coil, this being superheated quickly by the additional 15 degrees of temperature of the brine.

Now, let's reduce the capacity of the condensing unit one half or

Shown here are two drum type superheaters of different capacities. This type is especially advantageous where there is limited space between coil and compressor.

to a capacity of 5000 btu per hour. Then there would be only one-half the temperature difference between the brine and the refrigerant, with one-half the heat transfer. So the temperature of the refrigerant will be only seven and one-half degrees below the temperature of the brine. Therefore, with the brine temperature only seven and one-half degrees above the evaporating temperature it could not warm up to the ten degrees superheat. The result will be a tendency of the expansion valve to starve the coil to obtain a 10 or 12 degrees lower temperature than the brine. To regain the full operation of the coil, it would be necessary to change the expansion valve to a superheat setting of about six degrees and thereby complete the heat transfer in about the same amount of the cooling coil tube as with the previous case.

Let us consider another type of problem, encountered from time to time, for which the solution would be to change the superheat setting of the valve. I refer to jobs which have an oversized condensing unit on the coil. As an example, we will continue to use the above described brine-cooled job.

First, assume the capacity of the condensing unit has been doubled or amounts to 20,000 btu per hour and that the same coil is being used. The capacity of the coil, or the heat transfer, must also be doubled in order to handle the additional capacity of the condensing unit, and this must be done by widening the differential between the brine temperature and the evaporating temperature of the refrigerant. If the brine temperature was 15 degrees above evaporation temperature and it was necessary to double this difference, then it would have to operate at minus 15 degrees.

This difference could be made without changing the superheat setting of the valve, but if the power bulb of the expansion valve was submerged in 15 degree brine there would be a tendency for it to stay at that temperature because only refrigerant gas would be passing it and it would adjust itself at its previous setting of 10 degrees superheat. Which means that a frost back of the suction line is inevitable, because there would not be a low enough temperature to allow a complete evaporation or heat transfer to occur in the coil.

The proper method of correcting this trouble would be to change the superheat setting of the expansion valve. The coil would be made to operate efficiently by evaporating the refrigerant at minus 15 degrees and allowing it to warm up to minus 10 degrees at the power bulb. Or with the brine temperature still controlling the power bulb of the expansion valve, you would have 25 degrees superheat.

In general, it will be found best always to balance, as nearly as possible, the capacity of the coils, expansion valve and condensing unit. And with such a condition, a setting of 10 degrees superheat on the expansion valve will be ideal. Most expansion valves have that setting when shipped from the factory and it should not be changed except for a real reason. Even if the suction line frosts for the first two or three cycles, I would still give it time to adjust itself, before changing the adjustment. Once it is properly operating, there should be no reason to adjust the valve further.

You can usually determine before a job is installed whether or not it will be necessary to change the superheat setting of the valve by cross checking the relative capacities of the coil and condensing unit. On the jobs having an oversized condensing unit in relation to the coil, you will probably increase the superheat above the regular 10 degrees. And on those machines having an undersized condensing unit you will want to decrease the superheat. When using shop made coils for brine baths, etc., without a known capacity, it will be necessary to make adjustments until proper operating conditions are obtained.

It was only a few years ago when we first heard of refrigerant superheaters, and they were specified then mostly for air conditioning equipment and many advantages were claimed for them. Most of us were skeptical of all their claims which amounted to as much as 10% increase in capacity and saving of refrigeration. Now, we realize that there is a definite purpose for the so-called dryer or superheater, and that they can be applied advantageously to the regular run of refrigeration jobs as well as to air conditioning installations.

The refrigerant superheater has one particular function in any refrigeration system and that is not necessarily to increase the capacity, but rather to conserve the available refrigeration capacity by precooling the hot refrigerant liquid before it enters the point of expansion and to superheat the evaporated suction gas immediately after it leaves the cooling coils so as to minimize the loss of refrigeration to the warm air surrounding suction lines between the cooling coils and condensing

(Continued on page 66)

This type of superheater is provided by some manufacturers and shipped as part of the cooling coil. They are usually installed next to the coil itself.

MOTOR Service

Connecting Diagrams for Lap Wound A-c Motors

Part 7

By A. C. Roe

Railway Motor Engineer
Westinghouse Electric & Mfg. Co.

THIS article presents the six-pole, two-phase and three-phase star and delta, 3 and 6 parallel, connecting diagrams, Figs. 19, 20, and 21. These diagrams are arranged for 8 and 9 leads for dual voltage connection only. In addition, the difference between the long and short jumpers used to connect pole phase groups together will be discussed.

A study of Fig. 19 will reveal that there are eight jumpers, that each jumper has three groups connected to it, and that each jumper is also a line lead. It will be noticed that the line lead jumpers, designated as A1, B1, A2, and B2, each have two top leads and one bottom group lead connected to them; whereas the L5, L6, L7, and L8 lead jumpers have two bottom and one top group leads connected to them.

In Fig. 20, the three-phase star connection, there are 13 jumpers, and the star ring or jumper has nine permanent connections to it. Thus the three-phase star diagram is more complicated than the two-phase and requires more care in stubbing and connecting. In contrast, Fig. 21, the three-phase delta connection, has nine jumpers, and the three line lead jumpers, A, B, and C, each have six connections, while the remaining six jumpers each have three connections.

The foregoing details are mentioned because it is knowledge of such small items that enables one to quickly identify the various types of diagrams or connections, without endless checking or testing.

Short Jumpers

All of the connecting diagrams presented in this series use what is termed the short jumper, or top to top and bottom to bottom connection between pole phase groups. This short connection has many advantages, as compared to the long jumpers, as will be explained in the following discussion.

By referring back to Fig. 2, the four-pole, three-phase star diagram in the July 1939 issue, page 33, we find that the A-phase starts at the top of group number 1. The bottom of group one is connected by a short jumper to the bottom of group 4, or the jumper connects groups spaced 1 and 4 apart. Likewise, the top of group 4 is connected to the top of group 7, by a short jumper also spanning groups 1 and 4 apart. The bottom of group 7 is connected to the bottom of group 10, with a short jumper, and at the top of group 10 is the star connection, the end of the A-phase winding.

In Fig. 2 (July issue) we have progressed around the winding, picking up groups spaced 1 and 4 apart, or each succeeding group is of opposite polarity as N-S-N-S. Each jumper was of the same length and only spanned one quarter of the winding. Thus the 1 and 4 on a three-phase winding, or 1 and 3 on a two-phase connection, represents the shortest possible connection between pole phase groups.

Long Jumpers

There is another method that can be used to connect up a two or three phase winding and it can be called the long jumper method. We will describe it by use of Fig. D, in which we have filled in only one phase of the diagram to simplify the discussion.

We start the A-phase on the top of group number 1, which in Fig. D is also indicated as a north pole. The bottom of group one is connected to top of the next north pole group, or number 7. This jumper spans from group 1 to 7, and may be designated as a long jumper.

Then on a four-pole winding, as in Fig. D, the bottom of group 7 is connected to the bottom of group 10; or a short jumper connects a north and south pole group together. On a series connection, a short or reversing jumper is used at the end of half the groups in each phase, as shown in Fig. D. The next long jumper connects the top of group 10 to the bottom of group 4, or the second long jumper connects together the two south pole groups.

In Fig. D it will be noticed that a short jumper is used, after picking up all the like pole groups, to reach the next group in the phase of opposite polarity. Then the next jumper proceeds in an opposite direction.

Thus the long jumper connections are top to bottom, except the short reversing jumper which is bottom to bottom. Thus the fundamental point of the long jumper connection is that all pole phase groups of one polarity are connected together clockwise around the

(*Continued on page* 64)

THIS is the seventh article in a series that will present 45 modern connecting diagrams for two- and three-phase lap wound induction motors for use on four-, six-, and eight-pole windings.

A master table of the 45 diagrams was presented in the July 1939 issue together with the first three diagrams of the series. Three additional diagrams have appeared in each succeeding issue.

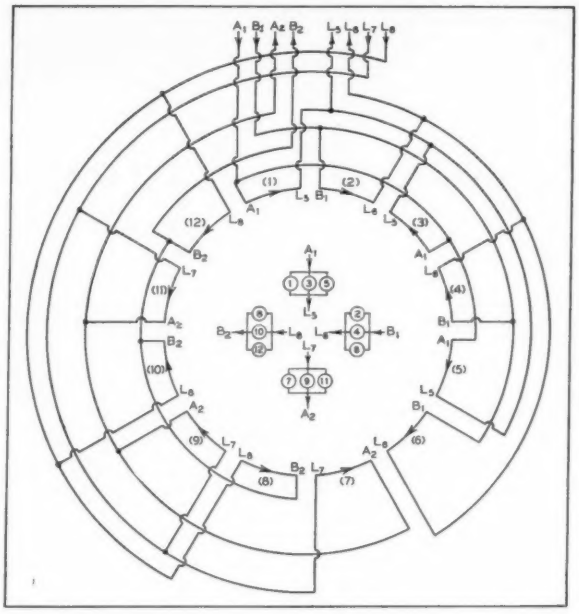


Fig. 19. Diagram for 6-pole, 2-phase with 4 or 8 leads for 3-parallel or 6-parallel connection. For 8 leads bring out A_1, A_2, L_5 and L_7 for A-phase; and B_1, B_2, L_6 and L_8 for B-phase. For 3-parallel, connect A_1 and A_2 to A-phase lines; connect B_1 and B_2 to B-phase lines; connect L_5 and L_7 together; and connect L_6 and L_8 together. For 6-parallel, connect A_1 and L_7 to A_1 line; connect B_1 and B_8 to B_1 line; connect A_2 and L_5 to A_2 line; and connect B_2 and L_6 to B_2 line.

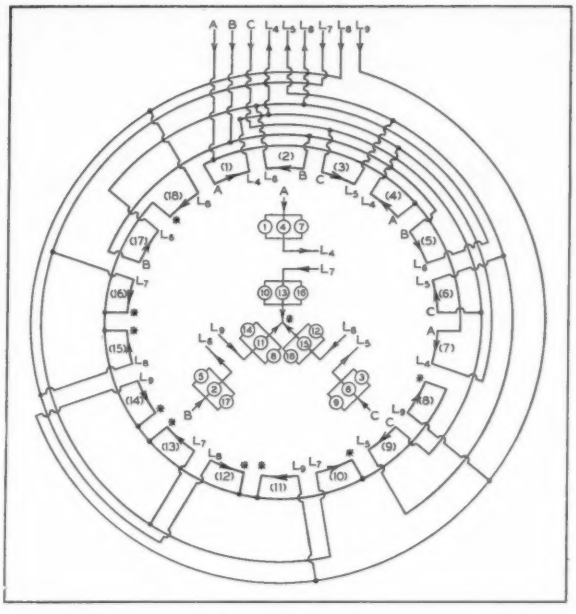


Fig. 20. Diagram for 6-pole, 3-phase with 3 or 9 leads for 3-parallel or 6-parallel star connection. Bring out 9 leads: A, L_4 and L_7 for A-phase; B, L_6 and L_9 for B-phase; and C, L_5 and L_8 for C-phase. For 3-parallel star connection, connect A, B and C to lines; connect L_4 and L_7 together; connect L_5 and L_8 together; and connect L_6 and L_9 together. For 6-parallel star connection, connect A and L_7 to A line; connect C and L_8 to C line; connect B and L_9 to B line; and connect L_4, L_5 and L_6 together.

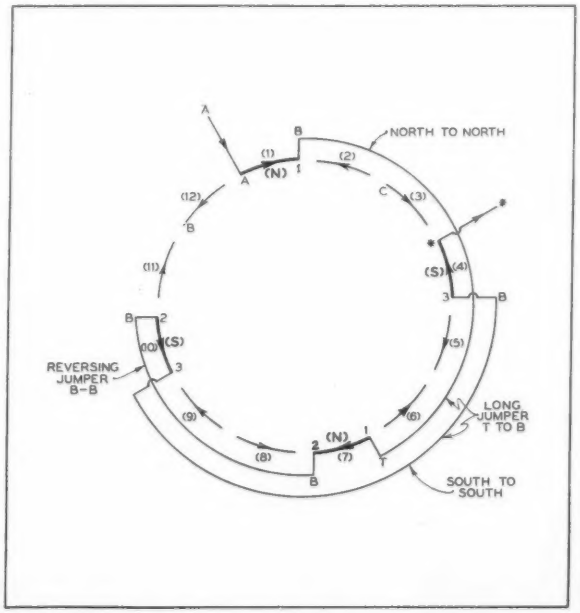


Fig. D. The principal features of the "long jumper" type of connection are indicated here. Only one phase is connected in order to simplify the diagram. All pole phase groups of one polarity are connected together clockwise around the winding; all those of opposite polarity are connected together counter-clockwise. All long jumper connections are "top to bottom" connections except the short reversing jumper which is "bottom to bottom." (See group 7 and 10.)

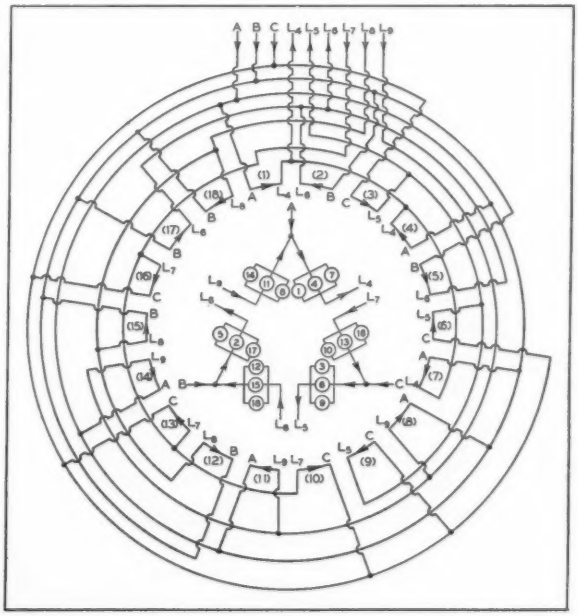


Fig. 21. Diagram for 6-pole, 3-phase with 3 or 9 leads for 3-parallel or 6-parallel delta connection. Bring out 9 leads: A, L_4 and L_7 for A-phase; C, L_5 and L_8 for C-phase; and B, L_6 and L_9 for B-phase. For 3-parallel connection, connect A, B and C to lines; connect L_4 and L_7 together; connect L_5 and L_8 together; and connect L_6 and L_9 together. For 6-parallel delta connection, connect A, L_7 and L_6 to A line; connect C, L_8 and L_4 to C line; and connect B, L_9 and L_5 to B line.

ENGINEERING SECTION

Rural Line Operating Problems

By L. C. Flournoy

Superintendent of Distribution
Alabama Power Company

MUCH has been written about the design, construction and cost of rural lines, but the operation of rural lines presents a serious problem to most utilities in the Southeast. This problem will increase in seriousness; not only as lines are extended farther and farther into the rural areas, but as lines now in service grow older.

Utilities are judged by at least three things: service, rates, and the understanding which the customers and the public have of the business. The demand for satisfactory service on rural lines increases rapidly as the business is properly developed. Customers, who depend on electric service for their water supply and the proper operation of their sanitary facilities, as well as the preparation and refrigeration of large quantities of food, deserve and will demand satisfactory service. Customers, who are supplementing their incomes through activities they did not engage in prior to receiving electric service, such as dairying, ice making, chicken raising, propagation of plants, and the operation of roadside gasoline stations equipped with electric pumps, will insist on satisfactory service as the financial success of such ventures is largely dependent on reliable electric service.

Unfortunately, both for the utility and the rural customer, there is no reliable means of communication in the majority of the areas now served by rural lines. The lack of communication frequently means long delays in reporting outages and, of course, makes clearing of trouble more difficult. Long interruptions will soon cause the rural customer to hesitate before becoming more dependent on electric service and the desire to be less dependent will be created.

In general, the rural customer will not receive as good service as the average urban customer; however, the responsibility for satisfactory service to rural customers has already been accepted by most utilities in the Southeast and the object of this article is to discuss broadly the problems we are confronted with as a result of the operation of rural lines.

Preliminaries

There are a number of things the customer should know either before or shortly after his electric service is established.

First — The rural customer should know the cost of service. Some companies think this so important that they have competent employees explain the rate and have the customer sign a prepared card on which an example of a typical bill is worked out. This is particularly important where an objective type of rate is in effect.

Second—The customer should be advised concerning the wiring of his home and the point on his premises where the utility will establish service. At least one utility has prepared and uses a "prospective customer letter," which gives, briefly, certain advice and recommendations concerning wiring and characteristics of the current that will be supplied, the voltage of lamps to use for the best service, and the phase and voltage of motors to purchase. On the reverse side of this letter are two detail drawings of service entrances; one covering the minimum requirements of the National Electrical code, and the other a recommended service entrance. This letter is sent out with notice that an extension will be made and is also handed to customers who come to the various offices for advice.

Lightning damage to poles and insulators is still one of the serious rural line operating problems.

Third—The customer should certainly know who to call on in case of trouble, the service the company will render, and where to pay his monthly bill. This may be accomplished through a bulletin with some such title as "Service Suggestions." This bulletin would advise the customer of the availability of the services of a home economist, a lighting specialist, an agricultural engineer, appliance repair man, and so on. This bulletin would also advise the customer of the purpose of fuses or circuit breakers, the dangers involved in bridging fuses, what to do in case of an interruption of his service, and the danger of cutting trees near lines.

Meter Reading, Billing and Collecting

The expenses involved in meter reading, billing and collecting on rural lines are much greater per customer served than are corresponding urban costs. This is due to the necessity of automotive transportation, distances involved, and time required. The growing volume of this class of work will certainly warrant investigations to determine if the work involved can be handled at less cost.

Careful consideration should be given to the arrangement of meter routes or scheduling of work to be

done to avoid any unnecessary riding time. This is particularly important during periods when customers are being added rapidly.

If possible, meter reading schedules should be arranged so that delinquent collections and "cut-outs" can be handled by the meter reader on his regular trip. This would require careful schedules; however, possible savings would be large.

There have been a number of suggestions, and considerable discussion, of ways to reduce the expense involved in this work. Some of these are as follows: prepay or coin type meters, furnishing the customer postal cards and requesting that they send in the meter readings, quarterly billing, and rendering bills as meters are read. In my opinion, the suggestion that bills be rendered as meters are read has possibilities without serious disadvantages; however, this plan would require a relatively simple rate structure and handling by intelligent employees. A simple rate structure will save the meter reader considerable time through reduction in the number of requests for rate explanations.

I would like to call particular attention to the opportunities of a rural meter reader. It seems to me that a meter reader on rural routes can, and should be an entirely diffrent type of employee from that used in the larger towns where all classes of employees are readily available. A properly selected employee for rural meter reading and collection work could turn in valuable reports to the proper parties regarding hazardous tree conditions, the condition or position of repeater fuses, and other conditions which should be corrected. What I am trying to do is to bring out the difference between a meter reader intent only on reading meters and an employee who reads meters but is also intent on being of maximum value to his employer.

Operation

The mileage of rural lines in service in the Southeast is enormous, and is still increasing. What are the troubles that are being experienced in the operation of these lines, or what causes and conditions are most apt to bring trouble and expense and what can we learn from our experiences?

1. Oil Circuit Breaker Operations and Fuse Blowings. I believe that most companies are having too many outages from the clearing out of repeater type fuses and pole type oil circuit breakers in cases where no permanent trouble is located. This is a problem which warrants careful investigation and it seems that the solution lies along the following lines: (a) Additional or improved lighting protection. (b) Better application of equipment. (c) Equipment having a wider range for coordination.

The solution, whatever it may be, will call for additional investment in equipment to reduce operating expenses.

Some of the questions which arise in this connection are:

At what intervals should lighting protection be installed or is protection at transformer installations only sufficient? The number of protection points, of course, will increase as new customers are served from existing lines.

What is the exposure limit in miles of single phase circuit for good service when protected by a pole top oil switch of the instantaneous reclosing type? Is it 40 miles—60 miles—80 miles or 100 miles?

What should be the exposure limit for a repeater type fuse? Ten miles—15 miles or 25 miles?

I do not have the answers to these questions, but am of the firm belief that in many cases circuits are being extended too far for the types of protective equipment used.

There is, in my opinion, a definite field for a small reclosing oil circuit breaker with time delay characteristics and variable tripping values.

The ideas as to what should be used to protect rural circuits at substations vary widely. Some seem to think that a high capacity oil circuit breaker fully equipped with relays is required; others, that instantaneous closing pole top breakers will give satisfactory service; and in some cases only repeater fuses are used at substations supplying several hundred miles of lines. The investment required is probably the determining factor in two of the cases just mentioned. In the first case the investment required is on the order of $2500.

I feel certain that there is a market for a reclosing oil circuit breaker with rupturing capacity suitable for 300 to 450 kva substations, if such a breaker can be purchased complete for less than $1,000.

2. Tree Contacts and Falling Trees. Common neutral lines and trees just won't mix. Some utilities have made it a practice to construct lines on state or county highway rights-of-way, which gives the utility no clearance rights or right of permanent position. Others have purchased private rights-of-way which, in the majority of cases, gives clearance rights and permanent right-of-line position. The private right-of-way plan is decidedly preferable if the line can be patrolled from the highway. If the line was

not properly cleared when constructed, the operating man is left with a real problem; and although the construction cost may have been low, the savings in operating expense in many cases would pay a good return on the additional money required for construction according to different plan or for properly clearing the line, if tree hazards were present.

In general, I believe that to clear rural lines of danger timber in accordance with transmission line practice is impractical, but inspections to locate dead and diseased trees and the removal of same is justified.

3. Lighting Damage to Poles and Insulators. The problem of lighting protection on rural lines is more difficult than in cities due to soil conditions, lack of underground piping systems, and lack of shielding by buildings.

Experience has shown that the destruction of poles by lightning may be reduced to a minimum through grounding; but the grounding of poles and pole cap pins on rural lines increases the number of flashovers during storms and imposes a more severe burden on other equipment. Experience of one company indicates that a two inch gap in the ground wire over four inches of the pole will reduce the number of flashovers and still protect the pole from damage by lightning.

There should be relatively little trouble from insulator failures on 6900 volt rural lines. There have, however, been some mighty mean cases of trouble from insulators on steel pins puncturing to the pins. This indicates a manufacturing defect in the insulators, as insulators correctly manufactured should flash over without puncturing. These statements refer to 17 kv insulators with 40 kv wet and 70 kv dry flashover value.

4. Equipment and Equipment Failures. In my opinion, pole type equipment such as voltage regulators, oil circuit breakers and repeater fuses have given satisfactory performance when the conditions of service were properly taken into account. There have been some improvements in recent months in pole type voltage regulators and oil circuit breakers, which should further improve performance.

During the past five or six years manufacturers have offered numerous types of transformers and protective equipment combinations for rural lines. Some of these were manufactured under pressure in an effort to reduce the first costs on rural lines.

There is not as yet a complete self-protecting transformer, or any combination of transformer and protective equipment, that is all that is to be desired; however, in many cases a material improvement in service has been effected by substituting the CSP type for the conventional type transformer.

One company's experience with type CSP transformers during the year 1938 is shown in the accompanying table.

Operating Experience with CSP Transformers

Number of CSP transformers in service, 10 kva and smaller	7,509
Kva capacity of CSP transformers, 10 kva and smaller	31,053
Total removals on account of unsatisfactory operation—number	109
Total removals on account of unsatisfactory operation Total removals on account of unsatisfactory operation—kva	442.5
Capacity removed, expressed as percentage of capacity in service	1.425%
Type CSP transformer winding failures—number	46
Type CSP transformer winding failures—kva capacity	233
Winding failures in per cent of capacity in service	0.75%

The operation and failures of meters on common neutral rural lines has been and is now being carefully studied by both manufacturers and utility men.

Some recent investigations indicate that there is no cause for alarm, so far, over inaccuracy of rural line meters due to the effect of lightning discharges on the permanent magnets and that recent improvements in magnets will more than take care of any adverse effects.

Meter failures from lightning on rural lines have caused considerable expense due to their remote locations. One company's meter failures on rural lines due to lightning since 1938 approximated 3% of the total meters on rural lines. The ratio of failures of outdoor type detachable meters to the conventional type indoor meter was ten to one. The majority of these failures were in areas where low ground resistances were impractical from the standpoint of cost.

A conclusion drawn from a recent paper on this subject is that meter failures are to be expected in cases where the ground connection on the customer's wiring has a lower resistance than that of the line grounds in the same vicinity. This is a logical conclusion, but what can be done from a practical and economical standpoint when the hard practical facts are a deep-well casing on the customer's premises, providing a low resistance ground, and all of the poles in the vicinity set in rock?

It would seem that providing a spill-over gap of some kind at a location where the high secondary potentials from induction and/or protective equipment discharges could be shunted around the meter and the customer's equipment might provide a solution. At any rate one company is experimenting along these lines in an effort to reach a solution. No results of this experiment are available yet.

Meter failures are not the only troubles by any means that result from conditions just described. Others are complaints from customers due to damages to inside wiring, and failures of appliances such as refrigerator motors, range units, and water heater elements.

5. Radio Interference. Radio interference can destroy customer good will. A great deal of time is often required to locate the cause of the interference and make corrections. Proper equipment is essential for this work. Satisfactory results can usually be secured with a good automobile radio with rectifier type milliammeter inserted in the speaker circuit. The ammeter scale should be approximately five milliamperes. Watching the ammeter indicator will be more effective in directing you to the cause of the interference than listening to the noise.

On lines insulated for 17 kv, the most frequent cause of radio interference is something loose. Loose clamps, tie wires, hardware or connections are the worst offenders.

Seventeen kv insulators on 6.9 kv lines seldom cause radio interference. Therefore, changing insulators should be a last resort.

Interference induced in parallels with higher voltage lines can be eliminated by corrections on

(*Continued on page* 43)

Insulation Applications of Glass Fiber Textiles

By Graham L. Moses

Insulation Engineer
Westinghouse Elec. & Mfg. Co.

THE development of fibrous glass has opened a vast new field to the use of glass as electrical insulation. Glass textiles have great flexibility, high tensile strength, resist deterioration at elevated temperatures and do not absorb moisture. The excellent insulating characteristics of glass have long been known and utilized by the electrical industry. However, until recently the use of glass was restricted by its physical nature as it was a hard, brittle vitreous material.

A vast amount of research work and development has been done to make possible the production of these minute glass fibers cheaply in large quantities of uniform size and quality. The individual fibers are closely controlled to a size of from .0002 to .0003 inch in diameter and are manufactured by two basically different processes.

The "staple fiber" process consists of a flow of molten glass through small holes in a platinum bushing in combination with steam pressure. The fibers fly out in short lengths (usually 4 to 12 inches long); these are picked up on a revolving drum and then are spun into yarn and woven into cloth by processes similar to those used by the cotton industry.

The "continuous filament" process was a subsequent development. It consists essentially of drawing the molten glass through fine holes in a platinum bushing. The filaments are wound on rapidly revolving spindles which draw out the molten glass, thereby reducing the size of the filament. In this process the speed of drawing the finished filament controls the diameter. Yarn is spun and woven by processes similar to those used in the silk and rayon industry.

In both processes electric heat is used for melting the glass. The material is fed into the crucible in the form of glass "marbles" and the quantity carefully is metered to maintain the molten glass at a constant level. A single "marble" three-quarters of an inch in diameter can be spun into an almost invisible filament 70 to 100 miles long.

Because ordinary soda glass has an affinity for water it was found necessary to develop a new formula for the glass used in insulating fabrics. This new material is an "alkali-free" glass which is not only rsistant to moisture but has better electrical characteristics; for example the insulation resistivity is much higher and is less affected by temperature changes.

Forms Available

Glass insulating materials are available in the following forms:

1. Tape. This is available in any standard thickness or width. The present limit on minimum thickness is 0.003 inch for continuous-filament tape, and 0.010 inch for staple-fiber tape.

2. Braided Sleeving. This is made from continuous-filament yarns in many standard inside diameters and wall thickness.

3. Glass-Insulated Wire. All sizes of round wire are being covered successfully with glass yarn, and many sizes of square and rectangular wire have been covered. Various thicknesses of wall are being used, depending upon the application, to produce an insulated wire size corresponding to standard asbestos-covered, cotton-covered, enamel and paper-covered, and silk-covered sizes.

4. Cable. This is also being insulated with glass yarn or tape for high temperature duty.

5. Woven Cloth. This is available at present in thicknesses of 0.002 inch and upward.

6. Combination Glass and Mica. Combination slot cells of glass cloth (or mat) and mica splittings are developed which result in a higher percentage class B insulation content.

This new insulating material has been used in the following ways for insulating electrical apparatus.

1. Field coils: glass covered wire, and tape for finishing.

2. Armature coils: conductor insulation, binding tape, finishing

"The Electric Motor of Tomorrow" was the title given this exhibit at the New York World's Fair. A completely Fiberglas-insulated motor in a standard five horsepower frame size is shown at the left delivering consistently the same power as the standard cotton-wound ten horsepower motor at the right. The two motors are hooked up to a dynamometer through a coupling and the load may readily be alternated between one and the other. The gauges show that the small motor, which is some 160 pounds lighter in weight and 45 per cent smaller in volume, will develop the same power as the larger standard motors.

FASTER FOR '40!

Every house needs
Westinghouse

Westinghouse

"The Line of Least Resistance"

NEW!

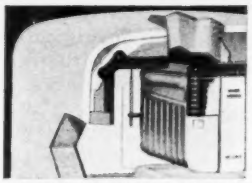
1940 PACEMAKER with Exclusive

TRU-ZONE COLD

the SUREST, STEADIEST food protection temperature control in any home refrigerator

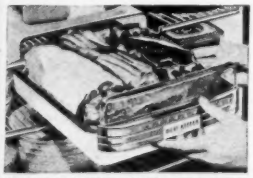
... plus striking new beauty in interior design ... adds up to a new sales-winning combination for 1940

TRUE-TEMP CONTROL lets user dial exact temperature—holds it true no matter how hot the kitchen gets.

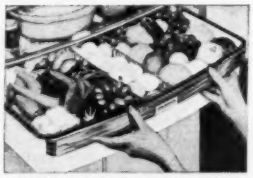


FIBERGLAS INSULATION is 10% more efficient than previous insulation—holds its efficiency for life.

MICARTA DOOR LINER is 6 times more resistant than steel to heat penetration—combines lightness with rigid construction.

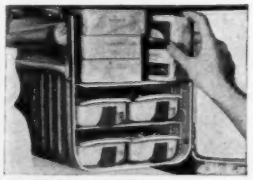


HUMIDITY FOR MEATS averages 85% in the big new sliding MEAT-KEEPER with crystal clear window-front.



HUMIDITY FOR FRESH FRUITS AND VEGETABLES averages 90 to 95% in the big glass-top Humidrawer.

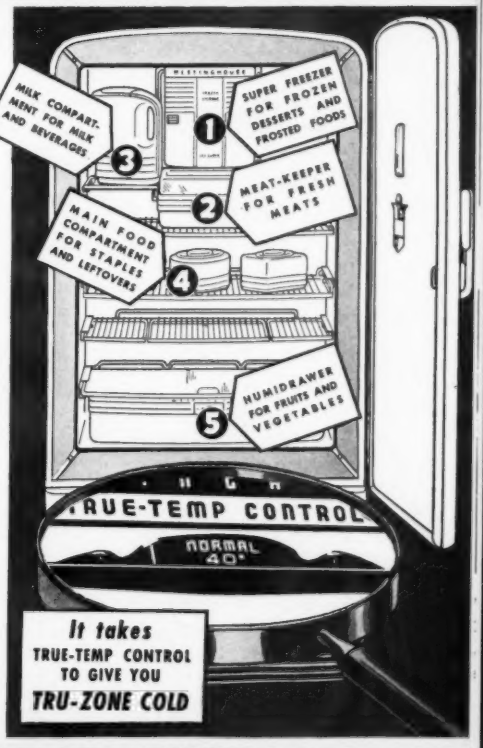
LEFTOVER DISHES of Peasantware are Hall Oven China. Set includes 2 leftover dishes, 1 butter dish, 1 water server.



FROZEN FOODS in liberal quantities can be safely stored in the double-height top compartment of the Super Freezer.

MILK AND VEGETABLES are protected by extra cold but not freezing temperature in the large milk compartment.

LOW COST OPERATION is big sales advantage with the famous Economizer Sealed-in Mechanism, improved for 1940.



Refrigerators

FASTER FOR '40..

WESTINGHOUSE ELECTRIC

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
MANSFIELD, OHIO

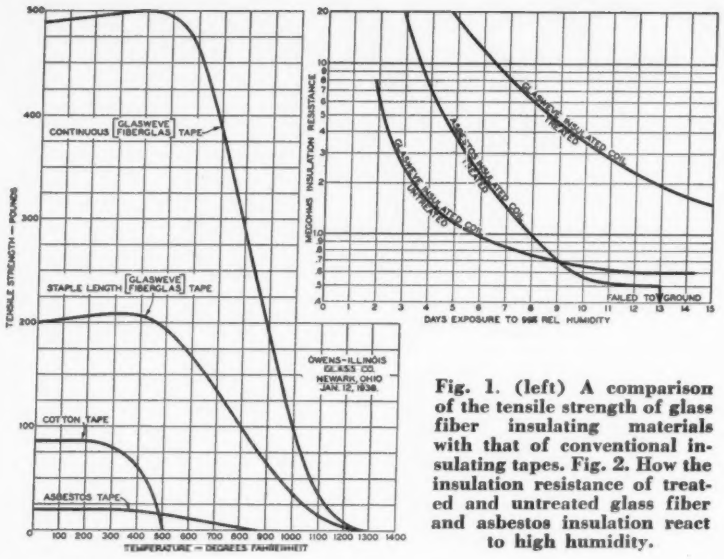

TENSILE STRENGTH — POUNDS
CONTINUOUS GLASWEVE FIBERGLAS TAPE
STAPLE LENGTH GLASWEVE FIBERGLAS TAPE
OWENS-ILLINOIS GLASS CO. NEWARK, OHIO JAN. 12, 1938.
COTTON TAPE
ASBESTOS TAPE
TEMPERATURE — DEGREES FAHRENHEIT
MEGOHMS INSULATION RESISTANCE
GLASWEVE INSULATED COIL UNTREATED
ASBESTOS INSULATED COIL TREATED
GLASWEVE INSULATED COIL UNTREATED
FAILED TO GROUND
DAYS EXPOSURE TO 95% REL. HUMIDITY

Fig. 1. (left) A comparison of the tensile strength of glass fiber insulating materials with that of conventional insulating tapes. Fig. 2. How the insulation resistance of treated and untreated glass fiber and asbestos insulation react to high humidity.

tape, for "spot taping" leads and loops, and sleeving on leads.

3. Magnet coils: glass covered magnet wire, sleeving on leads, wrapper under terminals, and finishing tape.

Every material has its weaknesses and disadvantages as well as its desirable features and glass textiles are no exception. One of its present limitations is its relatively low resistance to abrasion when the fibers are not lubricated or supported by impregnation. In tape and cloth form, the fibers are lubricated by an oil film applied during manufacture. In the apparatus this must be supplemented by varnish or other impregnant. When this lubrication or impregnant is eliminated or its qualities destroyed, vibration is apt to cause abrasive destruction.

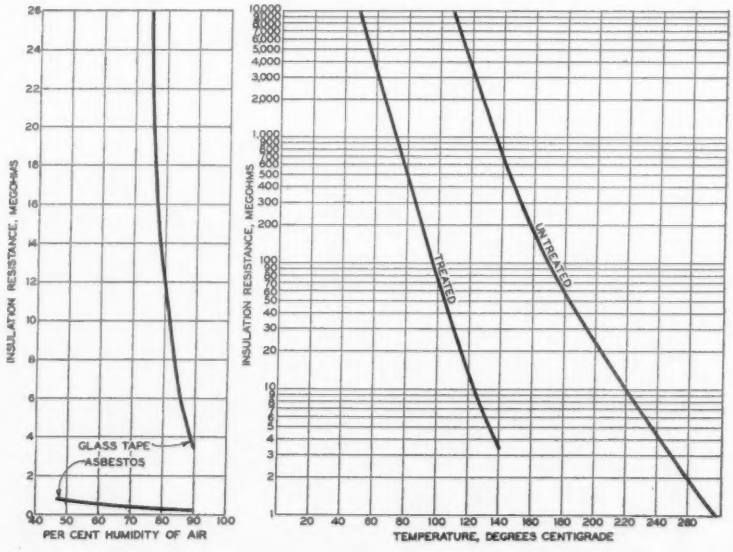
Another limitation is the relatively low shear strength of the glass fibers. This is an exhibition of the brittleness which has so long been associated with glass. To avoid this, apparatus must be designed to prevent exposing glass insulation to sharp corners or edges.

The very desirable smooth, silky appearance is in a sense a handicap as it permits the warp to slip on the weft. This is being reduced somewhat by the use of a closer weave. A practical method was devised to counteract this tendency by vacuum impregnating the rolls of tape in solventless varnish and only partially curing the varnish.

Glass fabrics have a very high tensile strength in comparison with other textiles. This very desirable characteristic permits the use of thinner tapes and wire covering in many applications. Improved "space factor" results in important design advantages. Because glass textiles do not contain any organic materials, their tensile strength is affected little up to temperatures of 300° C. (572° F.). They are 100% inorganic and do not deteriorate in mechanical or electrical characteristics at temperatures far above those now permissible in electrical machinery. When wrapped around a tube, glass tape takes a permanent set at 732° C. Its "strain point" is 807° C. and "softening point" is 835° C. The tensile strength is shown in comparison with conventional materials in Fig. 1.

Since glass textiles are woven, their inherent (untreated) di-electric strngth is only comparable to that of similar conventional woven materials. When treated they take on the characteristics of the varnish film as do other woven materials. For this reason it is not considered to replace mica for main ground insulation on high temperature (class B) machinery. Glass fabrics do have an advantage because they are "non-hygroscopic." For this reason the di-electric breakdown is higher than other materials after both have been exposed to high humidity. Tests indicate an advantage for glass of 1½ to 2 times the di-electric breakdown voltage of other woven materials under humid conditions. It is interesting and significant that in Fig. 2 the coil insulated with untreated glass eventually stabilized at a higher insulation resistance than the coil with treated asbestos insulation. This is generally interpreted to indicate that the effect of moisture absorption by the asbestos fibers, even when treated, is of greater moment than adsorption and accumulation of moisture around the untreated glass fibers.

(*Continued on page* 43)



The curves at the left give a comparison of the change in insulation resistance of glass tape and asbestos resulting from increased air humidity. Curves at right show variation in insulation resistance with temperature for treated and untreated glass fiber insulation.

Air-Blast Circuit Breaker Demonstration Staged

THOSE who were present recently at the demonstrations of General Electric's two new oil-less type breakers came away from Schenectady well impressed with the fact that they had witnessed the beginning of an epoch in electrical history. The demonstration tests staged by the company's switchgear division for its approximately 250 utility, railroad, and industrial guests, showed conclusively that new air equipments had been developed capable of serving in applications limited to oil-type breakers heretofore.

Two new circuit breakers were demonstrated and tested. One, called the "Magne-blast" because it interrupts its arc magnetically, introduces an entirely new principle in the technique of fast circuit interruption in air. It is designed for use with standard vertical lift-type metal-clad switchgear, thereby realizing all the inherent advantages of this type of switchgear. The Magne-blast is intended for 5,000-volt service at interrupting ratings up to 150,000 kva.

The air-blast breaker is designed for 15,000-volt service at interrupting ratings up to 1,500,000 kva. As its name implies, the air-blast circuit breaker utilizes a blast of air built up under high pressure to interrupt the circuit and break the arc. In addition, the high-pressure air is used to operate the breaker. The stream of air removes the arc products causing the circuit to be interrupted at first current zero after the contacts have been parted.

The testing of the new oil-less breaker equipment took place in the high-voltage testing laboratory of the company's Schenectady works. As they should have been, the actual circuit interrupting tests in themselves were properly uneventful. One official of the company, at the conclusion of the tests, reminded the guests of the old saying that such tests are usually "viewed with disappointment if nothing happens; disgust if something does." He congratulated the switchgear division in being able to "disappoint" its guests.

Company officials state that the new air-blast breaker will be made available ultimately in ratings up to 3,500,000 kva interrupting capacity at 287,000 volts, comparable to the largest type oil circuit breakers now on the market.

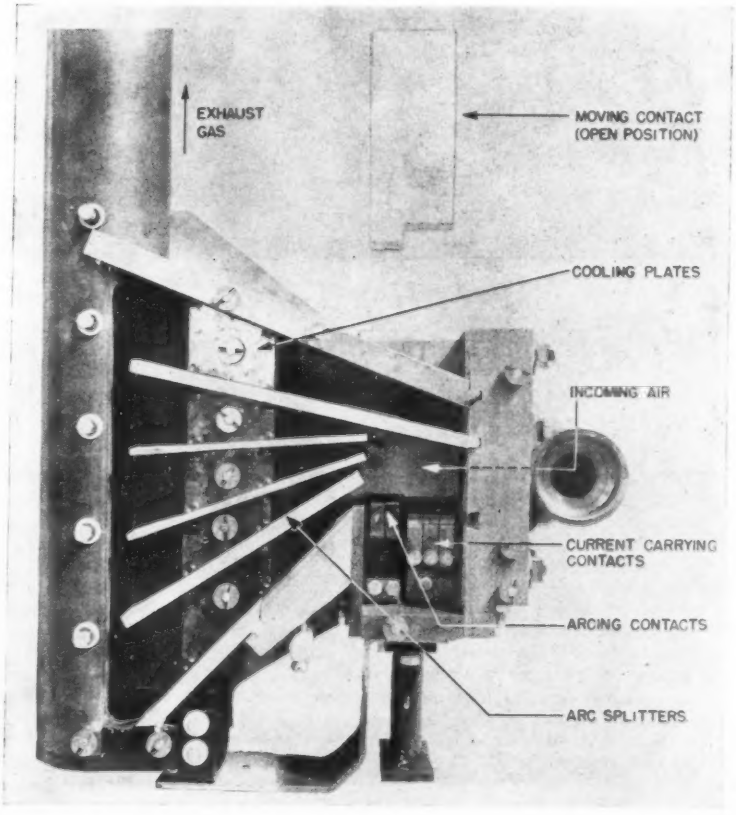
Air compressed to 150 pounds pressure is used to operate the air-blast breaker as well as interrupt the circuit. The high pressure air stream removes the arc products through a specially constructed air blast chamber and exhaust muffler, causing the circuit to be interrupted at first current zero after the contacts have been parted.

The breaker has a separate interrupting unit for each phase. The air blast chamber of the interrupting unit is one of the most interesting features of the breaker. This chamber may be inspected easily by removing a side plate, and the efficient manner in which the arc is quenched is readily apparent from the internal design and construction.

The chamber itself is of fan-like design; small where the air blast is introduced and large as it merges with the tall, cylindrical muffler. Arc splitters of insulating material form four separate arc chutes within the chamber proper, each attaining its maximum width nearest the muffler. Metallic cooling plates are located about halfway through each of the chutes to aid in dissipating the heat of the arcs.

The air blast is introduced at the rear of the chamber immediately behind the point where the arcing occurs between contacts. The arc is literally blasted through the splitters, and its products pass up through silencing baffles into the long Herkolite tubes.

The stationary main contact and



Cut-away view of the essential mechanism of the new air-blast circuit breaker which will be available ultimately in interrupting capacities up to 3,500,000 kva at 287,000 volts.

LEONARD REDUCES PRICES!

Isn't it beautiful? It's Leonard's lowest-priced 6¼ cubic foot model for 1940.. Model LSS-6.. offering *high quality* refrigeration at an amazing new low price. Look at its features!

1. 6¼ cubic-foot capacity.
2. Cabinet is welded-steel construction.
3. Heavily insulated.
4. Finished in Permalain . . . with Porcelain-on-steel inside.
5. Powered by famous Glacier sealed unit . . . that has, we believe, set an industry record for quiet, trouble-free performance.
6. 84 ice cube capacity. 9 lbs. ice.
7. Glass Cold-storage Tray under freezer.
8. Interior automatically lighted.
9. Temperature Control permits you to regulate speed of freezing and cabinet temperature.
10. 2 extra-fast Freezing Shelves.
11. Stainless-steel Zero Freezer with door.

Compare this great 1940 Leonard Model LSS-6 with other refrigerators selling for $30.00 more! Price, delivered only $119.95*

Here's How Leonard, a Company with 59 Years of Quality Manufacturing Experience, Squarely Meets the Three Big Problems Retailers Must Face in 1940

"HOW CAN I MEET low-price competition? How can I protect my profit margin? How can I get more replacement business?"

You—as a dealer—will probably agree these are the three most pressing problems in the retailing of refrigerators.

Here's the news that Leonard has for you today—a new program that enables you to meet every one of these issues!

A complete line of high-grade quality refrigerators at new low prices that enables you to meet *all* price competition.

A satisfactory profit margin on every model in the line.

Specific models and with adequate margins that give you a real advantage in the rapidly growing replacement market.

Here are savings for your customers that run up to $60 . . . comparing quality for quality, size for size!

Quality has not been sacrificed in Leonard's new program. We cannot emphasize this point too strongly. We have taken the finest cabinet Leonard has built in 59 years of experience and finished it inside and out with conveniences never offered before at these prices. Check over the specifications and you'll quickly prove this to your own satisfaction.

Each and every model is powered by the Glacier sealed unit which, we believe, has set an industry record, not only for quietness but for service-free performance. Notice, particularly, that Leonard's offering—for the first time—the Hi-Humid food-freshener system. A revolutionary new humidity feature that answers that old argument, "I'll buy a new refrigerator when you offer me something really new".

Prices begin at $119.95* for a big, family-size 6¼ cubic foot Leonard. From that price right on up, the step-ups in each model and its features and price will be your stepping stones to higher profits.

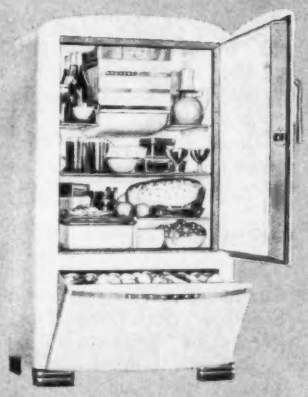
Now you can handle a product you *know* is good . . . one that is backed by the engineering "know-how" of one of the biggest companies in the business. And—you can make *more money* on it.

If you want details on this great new line—and the program behind it—wire Leonard Division, Nash-Kelvinator Corporation, Detroit, Michigan.

**Prices suggested are for delivery in the kitchen with 5 Year Protection Plan. They are exclusive of state and local taxes. Prices are slightly higher west of the Rockies.*

HERE'S LEONARD'S HIGH-PROFIT LINE FOR 1940

INCLUDING LSS-6 SHOWN ON OPPOSITE PAGE FOR $119.95*

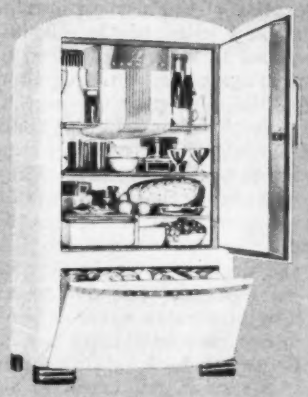


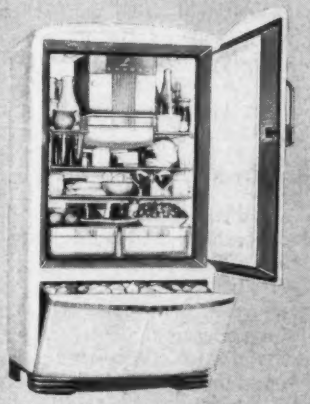
★

MODEL LS-6 *(at left).* Compare with $180 refrigerators. A completely equipped 6¼ cu. ft. model with sliding porcelain Crisper with glass cover, big Vegetable Bin, sliding glass Cold Storage Tray. Stainless-steel Zero Freezer with 2 extra-fast Freezing Shelves, aluminum door, special Cube and Tray Release Lever. 8 lbs.—64 ice cube capacity. Finger-tip control of freezing speeds. Automatic light. Permalain exterior and Porcelain-on-steel interior. Glacier sealed unit. Leonard's price only **$139.95***

★

MODEL LHS-6 *(at right).* Compare with $230 refrigerators. New Leonard 6 cu. ft. model with Hi-Humid food-freshener system. Sliding porcelain Crisper with glass cover. Meat Compartment built-in the freezer unit behind freezer door, 2 extra-fast Freezing Shelves, 8 lbs.—64 ice cubes, special Cube and Tray Release Lever. Revolving, wheel-type Temperature Control. Automatic light. Vegetable Bin. Permalain exterior, Porcelain-on-steel interior. Glacier sealed unit. Leonard's price only . **$169.95***



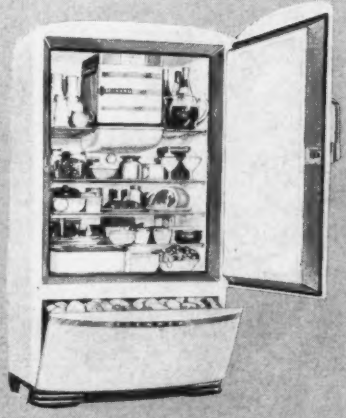


★

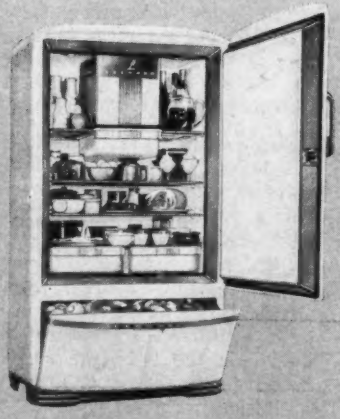
MODEL LR-6 *(at left).* Compare with $210 refrigerators. 6.5 cu. ft. Two porcelain Crispers with glass covers. Twin Dome lights. Sliding porcelain Meat-File with cover. Vegetable Bin. Stainless-steel Zero Freezer with door, 2 extra-fast Freezing Shelves, 8 lbs.—72 ice cubes, with Ice-Popper Cube Release and built-in Tray Release. Temperature Control with automatic return from defrosting. Permalain exterior, Porcelain-on-steel interior. Glacier sealed unit. Leonard's price only **$179.95***

★

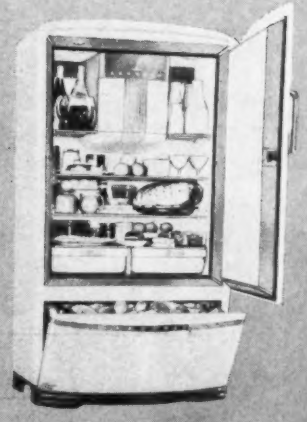
MODEL LHD-6 *(at right).* Compare with refrigerators from $230 to $300. New, 6.1 cu. ft., de luxe Leonard with all features including new Hi-Humid food-freshener system. Twin Crispers with glass covers, Twin Dome Lights, Vegetable Bin. Meat Compartment built-in the freezer unit behind the freezer door. 2 extra-fast Freezing Shelves, Ice-Popper trays with built-in Tray Release, 8 lbs.—72 cube capacity. Revolving wheel-type Temperature Control. Permalain exterior and Porcelain-on-steel interior. Glacier sealed unit. Leonard's price only **$209.95***



MODEL LS-8. Compare with $220 refrigerators. A big 8.2 cu. ft. refrigerator with 16.3 sq. ft. of shelf space. Stainless-steel Zero Freezer with aluminum door, 2 extra-fast Freezing Shelves, special Cube and Tray Release, 12 lbs.—96 ice cube capacity. Finger-tip control of freezing speeds. Sliding glass covered Crisper, glass Meat File, Dry Vegetable Bin of 1½ bushel capacity. Automatic light. Permalain exterior and Porcelain-on-steel interior. Powered by the famous Glacier sealed unit. Leonard's price only **$189.95***



MODEL LR-8. Compare with $250 refrigerators. 8.2 cu. ft. capacity with 16.3 sq. ft. shelf area. Two porcelain Crispers with glass covers, Twin Dome Lights, Vegetable Bin, sliding porcelain Meat File with cover. Stainless-steel Zero Freezer with full-height door, 2 extra-fast Freezing Shelves, Ice-Popper Cube Release and built-in Tray Release, 12 lbs.—108 ice cubes. De luxe Temperature Control with automatic return from defrosting. Permalain exterior, Porcelain-on-steel interior. Glacier sealed unit. Leonard's price only **$209.95***



MODEL LHD-8. Compare this refrigerator with the finest at any price. A new de luxe 8 cu. ft. model completely equipped including Hi-Humid food-freshener system. 15.9 sq. ft. shelf area. 2 porcelain Crispers with glass covers, Twin Dome Lights. Meat Compartment built-in the freezer unit behind freezer door. Ice trays have Cube Release, Tray Lifter, 12 lbs.—108 cubes. Revolving, wheel-type Temperature Control. Permalain exterior, Porcelain-on-steel interior. Glacier sealed unit. Leonard's price only **$239.95***

the stationary arcing contact are located in the air blast chamber just underneath the point at which the stream of air is introduced. The movable contact has access to the chamber from directly above, and travels vertically in opening or closing the circuit.

Operation of the breaker is trip-free at any point of the closing stroke, and no latch is required to hold it in open position. A piston utilizes the high-pressure air in closing the breaker. In the operation, an electrical impulse supplies air to the closing side of the main cylinder, causing the piston to move downward and close the contacts.

In the breaker's opening operation, an electrical impulse to an air blast pilot valve opens a pilot, the initial movement of which closes a switch to the opening trip coil. This operation in series assures air for the breaker's blast action before the contacts part and prevent unnecessary burning of contacts. A timing switch cuts off the air blast when the contacts have parted a predetermined distance.

The new air-blast circuit breaker is especially well adapted to the modern station type cubicle arrangement of switchgear. It permits the standard arrangement of buses, six isolating disconnecting switches, mechanical interlocks, current transformers, and other auxiliaries to be completely assembled and shipped as a single unit from the factory.

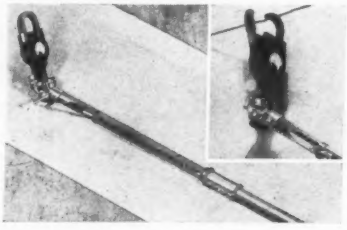
Over-all view of the recently announced air-blast circuit breaker.

Brief Reviews of New Equipment and Apparatus

Tips Amertong

A new tool that makes it possible to check amperages more conveniently and with greater safety has been introduced by the A. B. Chance Co., Utilities Division, of Centralia, Missouri.

Designated as the Tips "Amertong," this new development is made for use with the Weston Model 633 Clamp Ammeter and makes it possible to measure current distribution on high voltage with absolute safety and to reach out for conductors that are otherwise hard to reach.



It combines safety with convenience. The operation is simple—the ammeter clamp is opened and closed by simply sliding the hand grip up and down the pole as illustrated at right.

The spruce pole is tested to withstand 75,000 volts per foot for five minutes. The lever rod is laminated plastic. Castings are aluminum.

Burndy Mole Line

Recognizing the unusual interest being shown in underground secondary network construction at this time, the Burndy Engineering Company, Inc., of New York City, N. Y., has just released an illustrated folder on some of the items in the Burndy-Mole-Line.

An interesting feature of the folder is the two-page spread devoted to typical and unusual installations of Burndy underground devices. The last page gives detailed information on the various devices. Among those described are the "Mole"—a pre-insulated, clamp type multiple connector for joining network mains or tapping services. Some other items described are the Burndy "Molimiter," "Studmole," "Terminal Mole," the "Hycrab" and "Hypress," the "Limiter Lug" and the "Hypress Limiter," and the insulating jackets available for covering Limiters.

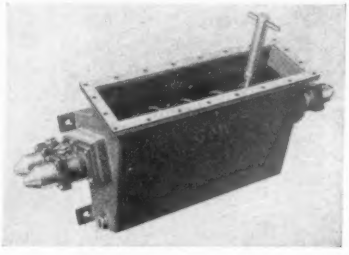
Copies of the folder may be obtained by writing the manufacturer.

Copperweld Booklet

Just off the press is an eight page booklet completely illustrated in color describing the unique process of molten-welding copper to steel in the manufacture of Copperweld. The booklet describes the rolling, drawing, and stranding of Copperweld wire and strand, and also describes the manufacture of Copperweld ground rods. Write to the Advertising Department of Copperweld Steel Company, Glassport, Pa., for a free copy.

Subway Disconnects

G&W Electric Specialty Co., Chicago, have added to their line of Type "PD" combination oil and air break disconnects a four way, single pole, 5000 volt, 500 ampere interconnecting device for subway installation. The plug links are operated by a bakelite insulated



handle. Full load is broken under oil and the air break in series with the oil break insures complete safety to the workman. A bakelite shield within the tank covers live parts. The bakelite handle is kept within the tank which is closed by a Resistoyl gasketed plate.

Rural-Line Transformers

The Wagner rural-line transformer, type HEB-F, has been redesigned to include several improved features. Two sets of hanger

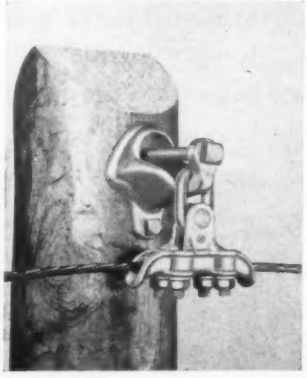
brackets located 180° apart are welded to the tank. The mounting slots incorporate a "jump-proof" feature that prevents the transformer from being dislocated from the pole because of sudden jolting or hitting of the pole. Three low-voltage stud-type bushings of new design are used. Two ground lugs equipped with solderless connectors are provided. A new easily accessible dial-type tap changer has been built into the HEB-F transformer. These and other improved features are fully explained in a new bulletin (TU-1A) on Wagner Rural-Line Transformers, available upon request to Wagner Electric Corporation, Saint Louis, Missouri.

Ground Wire Bracket

To provide a flexible support with high slip strength for ground wires the Ohio Brass Company, Mansfield, Ohio, has developed a new type of bracket, known as the "Swing-Link." The main body casting of this bracket has a groove on the outer side which holds a link at a distance of 3 inches from the pole. The link, in turn, supports a regular suspension clamp for holding the ground wire.

Since the link is free to swing on the bracket proper and there is a flexible connection between the link and suspension clamp, the device allows a ground wire to swing through a wide arc laterally, thus preventing damage to a wire when it is swayed by wind. This flexible arrangement also permits the bracket to be used for angle positions, by employing a regular suspension clamp to hold the ground wire, high slip strengths can be developed.

The bracket is attached to the pole by a through belt and is kept from turning by a lag screw. All parts are thoroughly and smoothly hot-dip galvanized. The Swing-Link can be furnished three ways: without a suspension clamp, with a 0.46-inch clamp, or with a 0.60-inch clamp.



Switch and Bus Insulators

A new line of switch and bus insulators is announced by Porcelain Products, Inc. · These insulators are assembled with a new asphaltic compound known as "Permalastic" compound which is permanently elastic and has a high softening point, as well as high elasticity at low temperature. Tests have shown that this compound will add many years to insulator life in addition to increasing their ability to withstand shocks and thermal strains. The line covers all standard N.E.M.A units as well as several special units. All units are available with either radio interference treated or standard glaze. Porcelain Products, Inc., Parkersburg, W. Va., will gladly send their new catalog to anyone interested.

Application of Glass Fiber Insulation

(*Continued from page* 38)

Glass textiles have many very desirable characteristics which can be summarized as follows:

1. Resistance to deterioration at high temperatures
2. Non-inflammable
3. Great tensile strength
4. High insulation resistance
5. Non-hygroscopic
6. Excellent di-electric breakdown strength when impregnated
7. Resists attack by moisture, acids, oils and corrosive vapors
8. Good thermal conductivity
9. Excellent appearance when treated

Glass insulation has proven satisfactory, if properly applied, on electrical equipment where weight and space requirements necessitate high temperature operation and the insulation is exposed to high humidity. The experience of the author covers a period of two and a half years involving over 50 types of motors and generators and several hundred units besides numerous magnet and relay coils for control apparatus. It is generally agreed that much field experience needs to be gathered regarding the life of this new material and its unknown service characteristics. However, it fills an obvious need and is a welcome addition to the family of insulating materials.

Rural Line Problems

(*Continued from page* 34)

the higher voltage line or by use of properly designed choke coils in the lower voltage line at the ends of the parallel.

Except in the case just mentioned, the best preventative of radio interference on rural lines is the careful selection of clamps of all kinds, the use of locking devices on all nuts, and good workmanship.

6. Lack of Coordination Studies. The use of protective equipment without knowing what it is reasonable to expect of the equipment may result in poorer service than if the equipment was not used. Proper coordination of protective equipment requires a careful study of the fault currents that may be imposed on the equipment.

The instantaneous opening feature of pole type oil circuit breakers practically precludes the use of fuses in series with them.

Maps of rural systems are necessary to proper planning of protection layouts, however, map layouts can often be improved by checking them in the field with the man who will be called on to restore service in case of trouble.

Maintenance

For this discussion, I wish to qualify the term Maintenance to mean replacements due to deterioration, rather than repairs due to accidents or storm damages. The maintenance problem is, I believe, for most companies in the Southeast, a problem of the future.

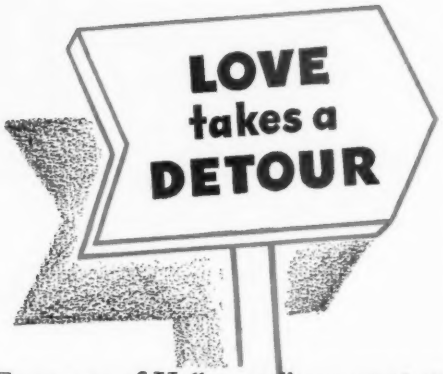
It is too soon for wholesale pole and conductor replacements. That is, if poles of long lasting qualities have been used and assuming that conductors were not damaged during installation; on the other hand, if steps have not been taken to protect conductors against vibration and burns under clamps and incidental to flashovers, expensive conductor maintenance may develop much sooner than expected.

If costs are to be kept within reason, rural line work must be most carefully organized. Systematic inspections by qualified inspectors must be carried out. Automotive equipment of proper weight and design must be used; and studies should be made to determine the advisability or economy of increasing the use of mechanical equipment.

THE ARISTOCRAT— *Beautiful new Hotpoint model in gleaming white porcelain enamel. Smartly styled for the kitchen of tomorrow.*

Hotpoint Presents

The Greatest Range Promotion Ever Offere



From one of Hollywood's greatest studi produced with a star-studded Hollywo cast, Hotpoint brings you this brilliant ne motion picture success to send your sal soaring in 1940. It's the smash-hit hea liner of the greatest promotional progra in Hotpoint history. Don't wait—plan no your local showing of "Love Takes Detour." Make full use of its dramatic sal punch. Hotpoint furnishes the comple plan and material. Write now for full detail

4 Reasons Why Hotpoint Means More Business for You in 1940

1 NEW MODELS—AT LOWEST PRICES EVER OFFERED FOR SUCH QUALITY

Don't take chances—show the *complete* Hotpoint line and win value-wise buyers from every price bracket. There's a brilliant new Hotpoint model for every need—at the lowest prices ever offered for such quality. Cash in on the exciting new beauty of the complete Hotpoint line.

2 NEW FEATURES MEAN NEW SALES POINTS

You'll win *more* sales... easier... faster... with the wealth of dramatic, exciting features Hotpoint has packed into every model of the 1940 line. Here is sales power to pull new thousands of prospects into your store—build profit volume every day of the year! See the complete line today!

3 NEW IMPROVEMENTS MEAN POWERFUL SALES COMPARISONS

Compare Hotpoint's brilliant beauty and breath-taking new features, point by point, with any other line on the market. See what a tremendous advantage Hotpoint's amazing improvements give you in the race for sales. Let Hotpoint work for you right from the starting gun—now!

4 THE MOST AGGRESSIVE SALES CAMPAIGN IN HOTPOINT HISTORY

Hotpoint is ready to put you out in front with a sensational program of Dramatized Promotion including national advertising, direct mail, retail contest material and a brilliant, Hollywood-produced motion picture. All these and other helps spell PROFIT for you throughout the year.

Hotpoint ELECTRIC RANGES

WATER HEATERS · WASHERS AND IRONERS

A great new line of Ranges and a great New Calrod

NEW CALROD

Faster, More Efficient, More Durable Than er. Less Wattage—Lower Operating Cost

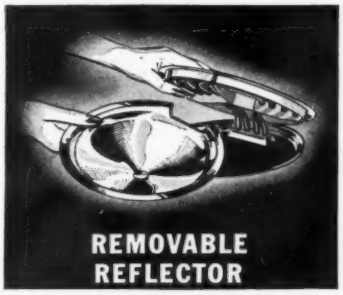
tpoint gives you the greatest electric range selling ture of the year — sends a vast new army of erested buyers to your door—with sensational w "self-cleaning" Calrod coils actually faster, more cient and more durable than ever before!

And — more amazing still — with all its vastly im-oved performance, the new Calrod shatters all former cords for economy, using less current than ever!

Here's a star, right out of the Hotpoint laboratories, at has the dollar sign of profit tied to it! Tie to it, , right now! Let the new Calrod, and Hotpoint's illiant new line of electric ranges for 1940, pull your es to the greatest heights they've ever known!

CROWNING 30 YEARS OF LEADERSHIP

NEW HI-SPEED CALROD—*Faster starting, more efficient, more durable than ever before—yet uses less current! Cash in on this sensational new feature—the greatest electric range innovation of the year.*



Simply lift the Calrod unit and the reflector "pops" out for quick, easy cleaning. No tools, no struggle, no "messin' around." A sure-fire hit with women.

Easy to clean—normal spillage quickly consumed in the glowi heat of the self-cleaning coi Should excessive spillage occur, t reflector can be quickly remove

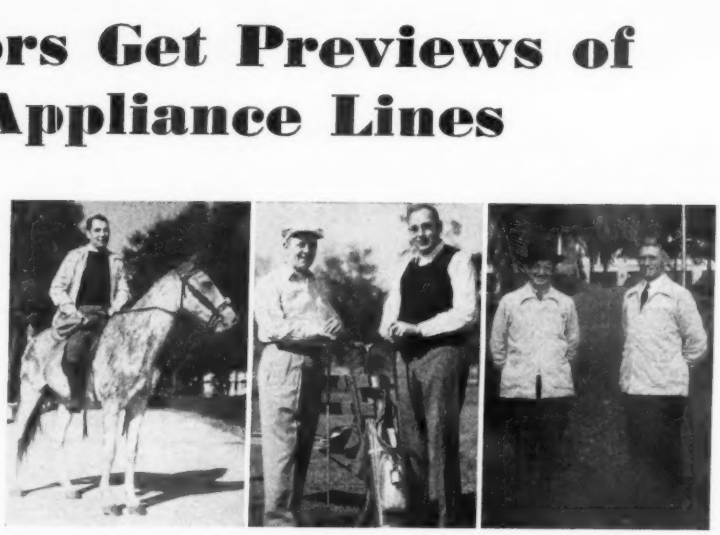
EDISON GENERAL ELECTRIC APPLIANCE CO., In
5614 West Taylor Street, Chicago, Illinois

REFRIGERATORS

ELECTRIC DISHWASHER-SINKS

Distributors Get Previews of 1940 Appliance Lines

Hotpoint



The Hotpoint Partners' meeting in Biloxi, Miss., brought Hotpoint executives from Chicago headquarters, managers from the company's twelve districts throughout the country, and principals from Hotpoint distributing organizations from Seattle to Florida. Among those attending shown here from left to right are Larry Merchant, Graybar Electric Company, Dallas; Cecil Prashaw, new Dallas district manager for Hotpoint; A. D. Byler, Hotpoint vice president and general manager; and S. R. Rogers and Lon M. Rish, both of the Bluefield Supply Co., Bluefield, W. Va.

R. W. Turnbull, Hotpoint vice president and general sales manager, in his keynote address at the Hotpoint Partners Meeting, held in Biloxi, Miss., Dec. 2-5, sounded the Hotpoint theme for the coming year—"Follow Through in '40!" Enthusiastically adopted by Hotpoint distributor principals who attended from all over the country, this slogan prefaces an even bigger year for Hotpoint home appliances in 1940, than the outstandingly successful one enjoyed in 1939.

At the Biloxi Partners Meeting, Hotpoint executives from all branches of the company made the first announcements of the new 1940 Hotpoint home appliances, together with an impressive array of sales and advertising plans, to back up each of the five Hotpoint lines. This meeting was the starting gun for what is said to be one of the most extensive merchandising programs in the electric appliance field. Every phase of appliance sales has been provided for, from national advertising, through retail sales training, to "Friendly Finance" plans, which make every family with any income, a prospect for Hotpoint home appliances.

As the Hotpoint distributor executives left the conference, plans were already underway for local presentations of Hotpoint's 1940 products and merchandising program to retailers and utilities selling Hotpoint home appliances. These meetings will be put on shortly after January 1, by individual Hotpoint distributors, with the cooperation of Hotpoint executives.

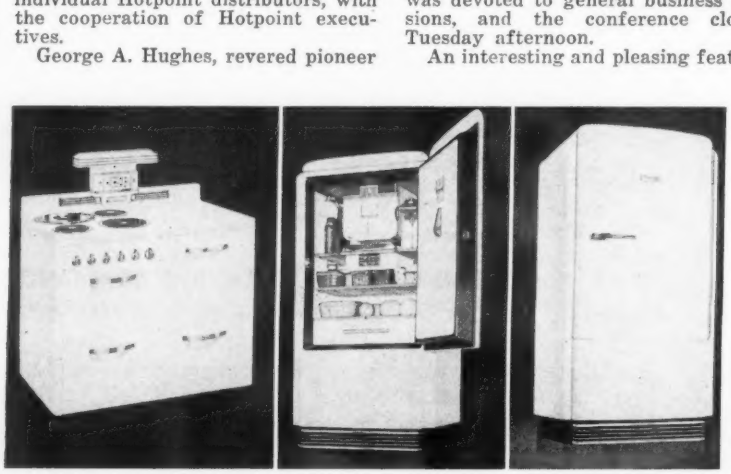
George A. Hughes, revered pioneer of the electric range industry, and president of The Hotpoint Company, opened the Biloxi conference with an inspiring address, which renewed once more the pride of all in the audience at their association with the Hotpoint organization. Mr. Turnbull's keynote address followed Mr. Hughes' welcoming speech.

No general business sessions were held on the opening day of the Hotpoint Partners Meeting. The first general session was held Sunday morning, and the second Monday morning, leaving both afternoons free for individual discussion. On Tuesday, December 5, the entire day was devoted to general business sessions, and the conference closed Tuesday afternoon.

An interesting and pleasing feature of the four-day meeting were the demonstrations of Edison-Hotpoint commercial cooking equipment. At breakfast, each day, Edison-Hotpoint Heat Manager Griddles were spotted about the dining room, each one in charge of a griddle cake expert. Real, Southern hot cakes were cooked right before the guests, and served hot from the Heat Manager. Edison-Hotpoint food warming equipment was also installed in the dining room throughout the meeting, and all hot foods served to those attending the Partners Meeting, were served directly from this equipment.

Hotpoint executives who took part in the program at the Sunday morning session in addition to Mr. Hughes and Mr. Turnbull, were: Harry E. Warren, manager, Home Laundry Division and M. H. Beekman, manager, Kitchen Sanitation Division. Messrs. Warren and Beekman each presented the 1940 products, policies, and merchandising plans on the lines for which they are responsible.

At the Monday morning session, F. B. Williams, manager, Hotpoint Refrigeration Division, presented the 1940 Hotpoint refrigerators, and their attendant merchandising plans. He was followed by Ross Smith, manager, Kitchen Sales Division, who discussed the housing project market, and ensemble appliance selling, via the planned kitchen layout. "Who Sells Hotpoint and Where" was the subject presented by A. Rebensburg, manager, Hotpoint Merchandising Research Division. George W. Scott, treasurer, The Hotpoint Company, discussed "Friendly Finance," and I. A. Rose, Hotpoint works manager, presented details of Hotpoint manufacturing.



Shown above at left is the new Hotpoint automatic electric range, the Aristocrat model RC4. At right is both an open and closed view of one of the new Hotpoint refrigerators for 1940.

The new, 1940 Hotpoint electric ranges were the subject of the presentation by Ward R. Schafer, manager, Hotpoint Range Division, on Tuesday morning, under the title of "Turn on the Heat." He was assisted by Miss Mildred Hickman, manager, Hotpoint Home Economics Department, who discussed and demonstrated the new Hotpoint range features. Service plans for 1940 were given by D. C. Marble, manager, Hotpoint Product Service Division. Next, A. H. Jaeger, manager, Hotpoint Water Heater Division, presented the 1940 Hotpoint electric water heaters, with plans for their promotion and sale. Miss Mildred Hickman concluded the Tuesday morning program with her presentation entitled "Kitcheneers."

A. D. Byler, Hotpoint vice president and general manager, opened the Tuesday afternoon session with an enthusiastic forecast for the coming year in appliance selling. He was followed by J. C. Sharp, Hotpoint chief engineer, who explained the "legitimate" method of cost reduction. Then came the presentations of Hotpoint's advertising and sales promotion plans for 1940. L. J. Sholty, vice president, Maxon, Inc., Hotpoint advertising agency, opened this portion of the program. Clinton Brown, Hotpoint's manager of campaigns and sales training, told of coming campaigns, and presented the Hotpoint Book of Knowledge—Hotpoint's new sales training course. W. A. Grove, manager, Hotpoint Advertising and Sales Promotion, described in detail what is said to be the most extensive program of advertising and sales promotion ever undertaken by the Hotpoint Company.

"Planning for Profits" was the subject of the talk by G. H. Smith, Hotpoint general merchandising manager, who explained how to tie together, in usable form, the products, plans and policies revealed at the preceding sessions.

The conference closed with an address by R. W. Turnbull, pledging Hotpoint's support throughout 1940, and urging once more that all those selling Hotpoint home appliances, take advantage of the opportunity contained in Hotpoint's vast 1940 program, and "Follow Through" with the tools made available to them.

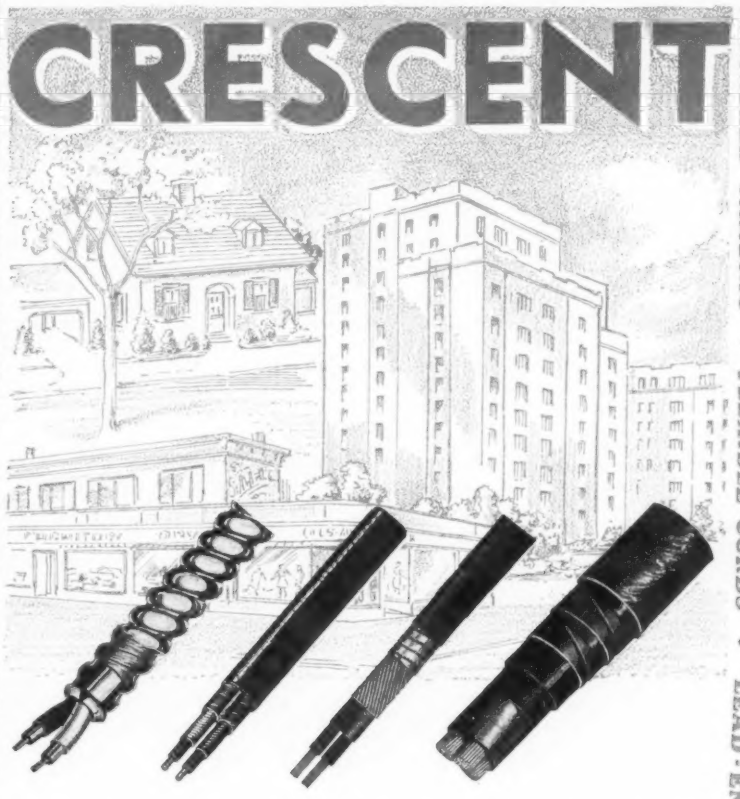
Hotpoint's 1940 electric water heaters include sizes for every household need, and for commercial use. They range from the 1 gal. size, and the 2 gal. "plug-in" Voguette, with its copper tank, to the large 140 gal. size for commercial use. Both Monel and galvanized tank types are included in the Hotpoint electric water heater line, as well as single and double unit types.

The famous, trouble-free Calrod immersion type heating unit is used in every Hotpoint electric water heater.

A distinctive addition to Hotpoint electric water heaters is the new, improved Hotpoint Vogue heater. This is a beautiful, all-white heater, with black base, of completely new design. There is no bulging front panel on this heater. Thermostat covers fit flush with the shell, giving smooth, unobtrusive lines. All the new Vogue heaters have galvanized tanks. They

RUBBER COVERED POWER CABLES • BUILDING WIRE

CRESCENT



STANDARD FACTORY FABRICATED

WIRES and CABLES

For Homes, Farms, Apartment Houses, also Stores and other Commercial Properties. With greater uniformity in physical characteristics and higher quality, they assure easier, speedier and more profitable installations at the lowest possible cost.

A.B.C. ARMORED BUSHED CABLE—
Most suitable for installation where water pipe grounding system is available.

SERVICE ENTRANCE CABLE—
From power line to service switch.

CRESFLEX Non-Metallic Sheathed Cable—
Better suited for installation where water pipe grounding system is not available.

PARKWAY CABLE, Metallic and Non-Metallic—
Installed at lowest cost underground without other protection.

CRESCENT INSULATED WIRE & CABLE CO. INC
TRENTON, NEW JERSEY

SOUTHERN REPRESENTATIVES

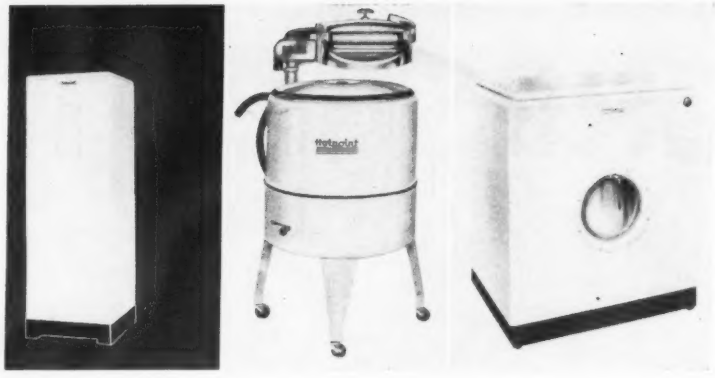
ATLANTA, GA.
Edgar E. Dawes
A-4 Rhodes Bldg. Annex

NEW ORLEANS, LA.
Paul Hogan, Jr.
823 Perdido St.

CRESFLEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • MAGNET WIRE • BARE WIRE

VARNISHED CAMBRIC • FLEXIBLE CORDS • LEAD-ENCASED AND PARKWAY CABLES • ARMORED CABLE

CRESCENT ENDURITE SUPER-AGING INSULATION



A distinctive addition to the Hotpoint electric water heater line is the new improved Vogue model shown at left. In the center is the Pathfinder model Hotpoint washer and at right a new tumbler clothes dryer.

are available in 30, 40, and 50 gal. sizes, either single or twin unit types.

Hotpoint's fourteen refrigerator models are presented in four groups —Imperial, DeLuxe, Standard and Special. Each group provides a compiete range of capacities to care for food storage requirements of all households. Imperial models include six, eight, twelve and sixteen cubic foot refrigerators; DeLuxe models are five, six and eight cubic foot capacity; Standard models are three, four, five and six cubic foot, and Special models are three, six and eight cubic foot capacities. The Hotpoint 8 cubic foot Special is designed particularly for rural families, to meet their need for large storage capacity at moderate cost.

Nine new models comprise the Hotpoint electric range line for 1940, combining improved cooking efficiency and convenience with unusual beauty and long life in ranges for all types of homes and all income brackets. There are six DeLuxe and three Standard models, all identified by new, distinctive styling.

The Crosley deluxe model ML8-70, a 7 cubic foot box, offers four exclusive Crosley features: the Shelvador, Freezorcold, Cold Drawer, and seven zones of refrigeration.

Crosley

Some 300 Crosley distributors and their salesmen who attended the Crosley convention at the Netherland Plaza Hotel, Monday, November 27, were told that sales of Crosley products during the first 10 months of 1939 were 53.1% over those of the corresponding period of 1938. This statement was made by T. W. Berger, general sales manager of The Crosley Corporation. These sales were distributed over refrigerators, radios, stoves, washers and ironers.

The increased sales were reflected in the optimistic spirit of distributors in attendance from all sections of the country and Canada. Business, they report, is definitely on the upgrade and without exception they look forward to further business gains in 1940.

The convention was opened by Lewis M. Crosley, executive vice president, The Crosley Corporation, in the absence of Powel Crosley, Jr., president, who is recuperating in Florida from a cold following his recent accident. Mr. Crosley conveyed his brother's greeting to the convention and announced that he expected to be able to return some time during the coming week.

The new 1940 line of Crosley Shelvador electric refrigerators was presented as the feature of the meeting by T. W. Berger and Neil Bauer, assistant sales manager. In addition new models of ranges, washers and radios were displayed.

One of the important features of the morning session was the announcement by Mr. Berger, that the Crosley Corporation will shortly announce an entirely new line of small commercial cars. Mr. Berger said that they would be as distinctive as were the Crosley passenger cars introduced earlier in the year. He recalled the development of these automobiles and described many entirely new features in their design and construction.

Others who spoke were R. J. O'Connor, manager of washer and range division, and William Shipley of the radio division.

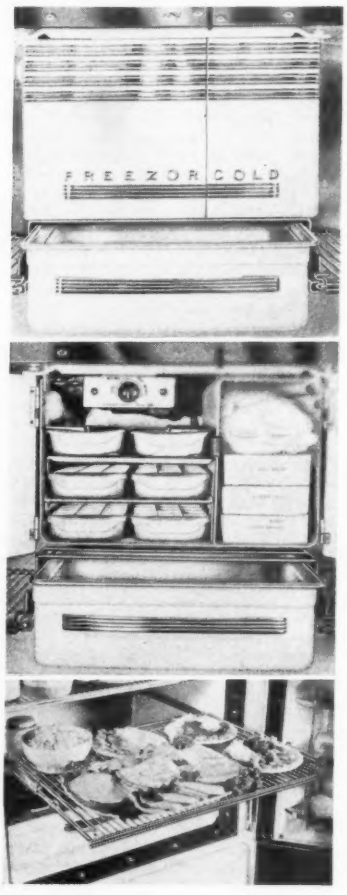
The banquet was given in the Pavilion Caprice of the Netherland Plaza Hotel Monday evening.

Tuesday was devoted to executive sessions and trips to the Crosley plant at Richmond, Indiana and the WLW transmitter at Mason, Ohio.

Thirteen models in five series comprise the new 1940 Crosley Shelvador electric refrigerators introduced at the Crosley distributors convention.

Distinctively new features, features that embody the utmost in practicability for the housewife are incorporated in the new models. One of the most sensational is the incorporation of the Freezorcold unit in all Crosley Shelvador electric refrigerators with the exception of the one table top model.

This Freezorcold 2-part cooling unit is a miniature cold storage plant of greatly increased capacity. It is a separate compartment for storing frozen foods; for freezing fresh meat, game, poultry, and for keeping ice



Two views of the new Crosley Freezorcold unit are shown above. This unit is literally a miniature cold storage plant. Just below it is the Cold Drawer for meat and other storage which features a new type lid that raises automatically when drawer is pulled out. At bottom is a typical sliding shelf which pulls out full length with automatic stop.

FRIGIDAIRE

Good as Gold for '40

● Frigidaire, America's No. 1 Refrigerator, leads again! There's a bit of selling magic in its thrilling new features . . . a touch of genius in its exciting new beauty. It's the crowning achievement of a score of Frigidaire successes. A sales-making, profit-making champion like you've never seen before! We say it, and all America will shout it: "It's Frigidaire for '40"!

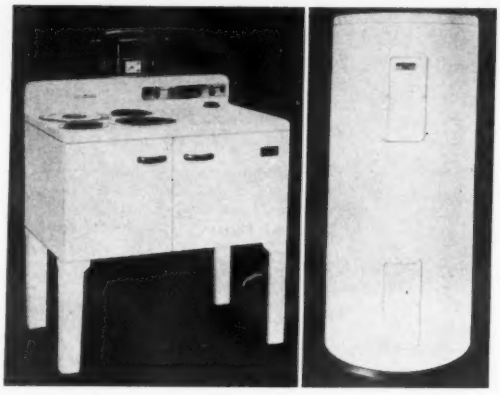
Soon it can be told. This month, Frigidaire is unveiling the refrigerator sales leader of the year, the new 1940 Frigidaire with the Meter-Miser. Expect to see something startling in its departure from conventional practice. Let your eyes confirm what words alone cannot reveal. Simultaneously announced will be Frigidaire's beautiful companions, the new and farther advanced Frigidaire Electric Range—sensation of the industry—and the new Frigidaire Electric Water Heater, literally brimming with sales appeal.

Make no mistake. Frigidaire Dealers, kingpins of the industry, will again have an unbeatable combination of products and selling advantages this coming year. Their profits will mount, as sales volume swells. No idle promises these, for the path is charted, the way is clear. The opportunities of Frigidaire Dealers are "good as gold" in '40!

FRIGIDAIRE DIVISION • GENERAL MOTORS SALES CORPORATION
DAYTON, OHIO

cream. It holds 8 to 12 pounds of meat. A separate ice cube compartment has refrigerated shelf for fast freezing. A removable shelf is provided for greater flexibility and increased storage of ice cubes or frozen desserts. (The compartments are completely enclosed with smartly styled doors that close automatically). Freezorcold models have a moist, cool food compartment to keep fruit and vegetables fresh and crisp.

The spacious Cold Drawer is located right under the Freezorcold unit and has temperatures slightly above freezing. Easily opened with one hand, the lid lifts automatically as the drawer is pulled out. The Cold Drawer and Freezorcold Chamber have a capacity for storing upwards of 20 pounds of food.



To meet the demand for a low priced full capacity leg type electric range with all of the necessary equipment for successful cooking, General Electric has announced this new model G-52-D. At right is a new all white round electric water heater recently introduced by General Electric available in sizes from 30 to 86 gallons. Price reductions of as much as 10% on some General Electric water heater models were also announced recently.

General Electric

Opening the doors for the first time to its new institute building the General Electric Company entertained approximately 200 of its appliance distributors and their sales managers at Bridgeport, Conn., on December 6, 7, and 8, with a preview of appliance product lines for 1940 and a presentation of advertising and merchandising plans for the coming year. District sales managers, product specialists, and headquarters officials of the G-E appliance and merchandise department swelled the attendance at the preview to well over 300 and packed the auditorium of the institute to capacity during all three days.

The occasion was marked not only by the opening of the institute, which is now the focal center for the company's appliance activities, but by the bringing-together, for the first time in the history of the previews, of engineering, sales, and promotional managers of every G-E appliance product line in a single presentation covering three days. Distributors and G-E district managers from every district in the entire country represented a national cross-section of appliance merchandising activities, expressed their high satisfaction with the results of 1939 business, and enthusiastically received the disclosure of products and plans for 1940.

The preview officially introduced to the distributing organization H. L. Andrews, vice president of General Electric, and now the executive head of the company's entire appliance operation, and it brought before the guests as dinner speaker at Brooklawn Country Club on the first evening Charles E. Wilson, long known to them as an active figure in the G-E appliance operation but as of January 1 the new president of the General Electric Company, succeeding Gerard Swope. T. K. Quinn, president of Maxon, Inc., advertising agency, was the principal speaker on the second night's dinner program at the Stratfield Hotel.

The first day's sessions in the air conditioned auditorium of the new institute building were under the chairmanship of Carl M. Snyder, assistant manager of the appliance and merchandise department in charge of sales. The day was devoted entirely to new product presentations covering clocks, vacuum cleaners, fans, heating devices, home laundry equipment, radio, electric sinks, and kitchen cabinets, ranges, water heaters, and refrigerators. Elaborate skits and demonstrations taxed the backstage facilities of the auditorium. The program opened with a dramatic prologue and closed with the presentation of the 1940 refrigerator line, high spot of the day's product show.

The second day's program featured promotional story on the same new lines. Highlights were an announcement of the continuation of the G-E full-line national advertising program, in both magazines and trade journals, and greatly expanded product schedules, both in magazines and newspapers, for the separate products. Special emphasis will be placed in 1940 on the newer major appliance lines, including the dishwasher, disposal electric sink, and steel cabinet lines. B. W. Bullock, advertising manager, was chairman of the day.

Third day of the convention was devoted to policy and special merchandising efforts, under the direction of L. H. Miller, merchandising manager. Presentations included the programs for department store, electric service company, rural electrification, home-building, and apartment house markets, with the Home Bureau and the General Electric Contracts Corporation contributing. The proceedings closed with the announcement of a new retail development program designed to weld dealer salesmen throughout the country into an aggressive organization which will take greater advantage than in the past of planned sales training. Details of the new program will be announced shortly.

All meetings of the convention were held in the new institute, which has been constructed within the gates of the G-E Bridgeport plant as an appliance display and demonstration center and which will house all future group activities of the appliance and merchandising department. Complete-

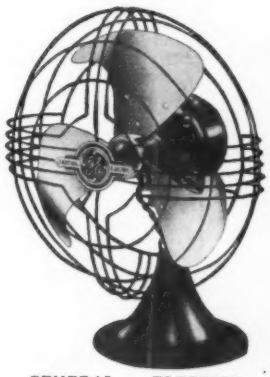
General Electric Company entertained approximately two hundred of its appliance distributors in Bridgeport early in December. At left, Bill Driscoll, G-E distributor of Charlotte, N. C.; Jean DeJen, manager of General Electric retail development section; and W. T. Christy, manager of G-E factory branch at Tampa, Florida. In center, H. L. Andrews, vice-president in charge of General Electric appliance operations, and J. T. Rainbault, manager, electric clock section. At right, J. B. Crew, range specialist and J. M. Walker, district manager, Atlanta.

AIR CIRCULATING AND COOLING EQUIPMENT

COOLVENT Attic Fans with Certified Rating. Handles more air at slower speeds and with more quiet operation. Twin rubber mounted ball bearing pillow blocks and resilient base, semi-enclosed motor. Autovent Fan and Blower Co.

SIGNAL'S Deluxe streamliner. Desk Type Fans available in a range of sizes from 8" to 16" in both AC Induction and Universal models. Signal Electric Mfg. Co.

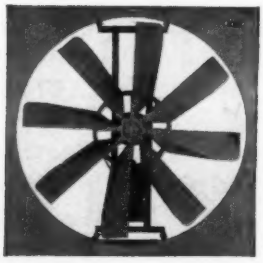
HUNTER Adaptair Hotel Type 52" Ceiling Fan. Instantly adjustable for either up or down draft. Hunter Fan & Ventilating Co., Inc.



GENERAL ELECTRIC Super-Quiet Fan (oscillating and non-oscillating) with the new scientifically shaped and pitched Vortalex blades for greater air movement and quieter operation. Streamline guard design. General Electric Co.

American Coolair Corp.
Autovent Fan & Blower Co.
Buffalo Forge Co.
Diehl Mfg. Company
General Electric Co.
Hunter Fan & Ventilating Co., Inc.
Reed Unit-Fans, Inc.
Signal Electric Mfg. Co.
Westinghouse Elec. & Mfg. Co.

HL Air Circulators: 20", 24" 30" sizes. Single and two-speed ating and non-oscillating mod-Floor, counter, wall and ceiling.



COOLAIR'S improved home-cooling fan for 1940—all moving parts "float" in larger, sound-absorbing springs. Ultra-quiet, easy to install, lightweight steel frame and blades, long hour service motors. 12 sizes for homes, 16 for commercial jobs. American Coolair Corporation.

SEE
FEBRUARY ISSUE
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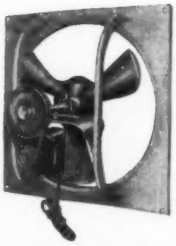
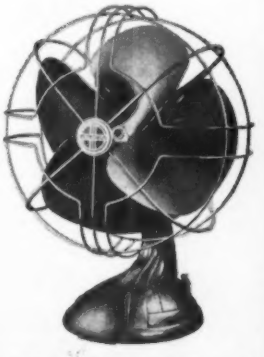
NEW MODELS
of
REED UNIT-FANS
by
Reed Unit-Fans, Inc.,
New Orleans, La.



BUFFALO Breez-Air Attic Fans are made in a complete range of sizes, capacities from 4,000 to 17,000 c.f.m. This line features quiet operation, requires no springs or other special mountings. Buffalo Forge Company.



WESTINGHOUSE "POWER AIRE — Ultra-Quiet Micarta blades, current-saving Capacitor motor, and Hamor-bronze finish. Provides "Hushed Coolness." Westinghouse Elec. & Mfg. Co.

HOT Weather Will Be $PAY $DIRT Weather for BREEZ-AIR Attic FAN Dealers!

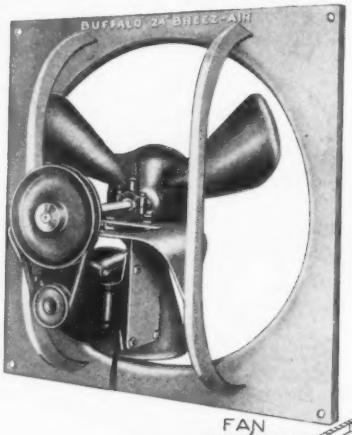
Because Breez-Air Fans will give your customers the kind of *quiet*, trouble-free comfort cooling that will bring you many more customers and prospects for these better attic fans.

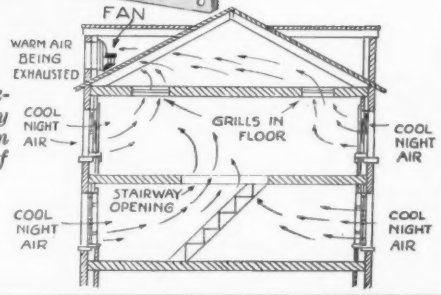
So if you are building for the future, don't sell any old fan, but insist on the famous Buffalo Breez-Air Attic Fan.

Get the Facts Now

Hot weather will soon be here again. Write us now for complete information on how you can make more money every summer as a Breez-Air Attic Fan dealer.

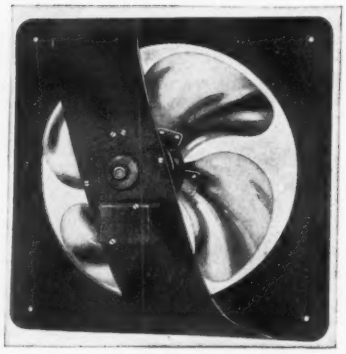
BUFFALO FORGE COMPANY
210 Mortimer St., Buffalo, N. Y.
Branch Engineering Offices in Principal Cities
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.





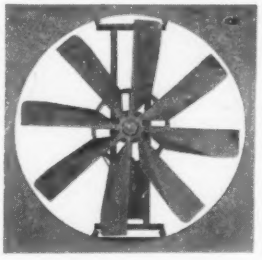
The Breez-Air is easily installed in the attic of any home.

Avail-able in 3 Sizes



10"—$9.80 List
12"—$12.50 List
16"—$16.50 List

QUIET! New *built-in Springs* eliminate vibration noise in the Coolair fan . . . make it easier to sell and simpler to install. Greater air delivery, lower prices, 5-year guarantee are other sales features that appeal to every prospect. Sell Coolair fans now to home-builders. Write for FREE illustrated catalog.



Coolair Ventilating and Cooling Systems
AMERICAN COOLAIR CORPORATION
Manufacturers . . . . JACKSONVILLE, FLORIDA

Now!... a quality Vent Fan at startling low price!

● Here's a brand new line of low priced, feature-plus Ventilating Fans—the Challenge Line. These fans are modernly different in appearance yet characteristic of the well known Signal performance and dependability. Outstanding features of these fans include: Streamline Design, Totally enclosed motor, Self-Lubricating bearings, with wool-packed oil reservoir, Chrome plated fan blades. Quiet operation, Easy-to-mount frame. These Challenger Vent Fans are adaptable for installation in walls, windows and transoms. Write for complete information now.

SIGNAL

SIGNAL ELECTRIC MFG. CO.
Menominee, Michigan, U. S. A.
Branch Offices:
W. E. Hopper
357-59 Marietta St., Atlanta, Ga.
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Be Sure The . . .
ATTIC FANS
You Install Have CERTIFIED RATINGS

Investigate The New 1940
COOLVENT
Send for New Bulletin, Now!

AUTOVENT FAN & BLOWER CO.
1825-27 N. Kostner Ave., Chicago, Illinois

Go to town in 1940

WITH DIEHL fans

ALERT and progressive dealers and distributors recognize in the Diehl 1940 Fan Line an exceptional opportunity to secure greater sales volume and to step-up profits.

Distinctive styling, quality construction and a wide variety of models encourage consumer buying. Fast selling leaders pave the way for general acceptance of the complete line. Many items such as kitchen ventilators and other ventilating fans are saleable in all seasons of the year — assuring year-round profit. No sales need be lost through inability to supply customer requirements—there is a size and type for every need.

Buying has started! Prepare now for a bigger and better fan year! Ask your wholesaler, or write to us, for our 1940 catalog, price-lists and samples of merchandising aids.

DIEHL 1940 FAN LEADERS

"JUNIOR" OSCILLATING FANS: Popular, streamlined, 10" and 12" models, handsomely finished in modern green, excellent air movers, moderately priced.

AIR CIRCULATORS—*Oscillating and Non-Oscillating:* 20", 24" and 30" sizes for floor, counter, wall or ceiling mounting. Unexcelled for large volume air movement in super-markets, restaurants, hotels, offices, retail stores, etc. "Utility" and "DeLuxe" models to meet all service requirements.

KITCHEN VENTILATING FANS: 9" and 10" blade sizes, of new and improved design. For window or wall installations. Wall models include cabinet, shutters, and adjustable sleeve to fit varying wall thicknesses. Handsome, dependable and popularly priced. Saleable from January to December.

QUIET ATTIC VENTILATORS: 24", 30", 36", 42" and 48" sizes available. Material for suction chamber combines with fan packing case to reduce cost of installation. Excellently built and efficient units which ideally meet the rapidly growing demands for home cooling equipment.

←*The DIEHL Fifty-first Annual Fan Catalog is off the press. Write for your copy today.*

DIEHL MANUFACTURING CO. • Elizabethport, N. J.
Electrical Division of THE SINGER MANUFACTURING COMPANY
ATLANTA • BOSTON • CHICAGO • DALLAS • NEW YORK • PHILADELPHIA

Watch This Space

FOR THE LATEST DEVELOPMENTS

IN

ATTIC VENTILATING EQUIPMENT

— • —

WRITE FOR OUR PLAN OF DEALER AND JOBBER MARKETING

REED UNIT-FANS, INC.

Manufacturers of Ventilating Equipment

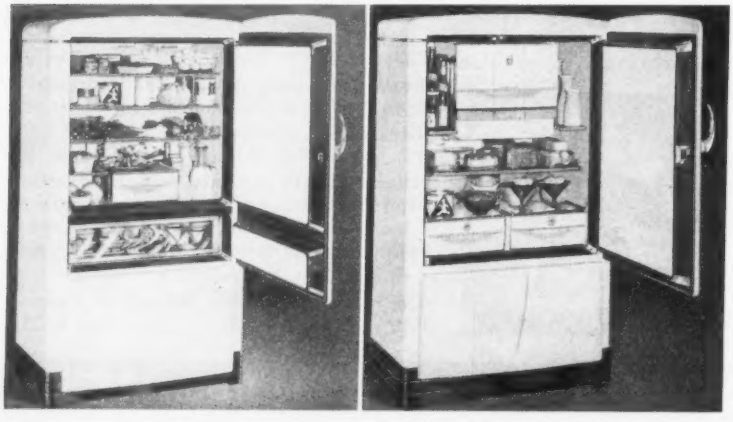
NEW ORLEANS, LA.

Factory:
501-3 N. St. Patrick St.

Sales Office
811 St. Charles Street

ly air-conditioned and luxuriously appointed throughout, the institute embodies the best features of the former institute at Cleveland with many new facilities inspired by modern conditions. The large auditorium on the first floor is equipped with projection booths, special lighting and sound controls, modern stage equipment, and a flexible seating arrangement. The auditorium is accessible from the main entrance and from the lounge which adjoins it, and in which are displayed electric kitchens and appliance groups. The second floor of the institute will constitute the home service center upon its completion in a few weeks, enlarging the facilities for appliance demonstrations, cooking schools and home economics training which were available at Cleveland.

New product lines were displayed to preview visitors in Preview Hall directly across the street from the institute. In the same building are located the new headquarters of the G-E Home Bureau.



A special feature of the Stewart-Warner model 860 refrigerator for 1940 is the freezing locker shown above just below the regular food storage compartment. At right is an open view of model 570.

Stewart-Warner

The 1940 line of Stewart-Warner electric household refrigerators, comprising 12 new models, was introduced at the annual national convention of the refrigeration division, Stewart-Warner Corporation, held in Chicago Nov. 27 and 28 at the Edgewater Beach Hotel.

The keynote of the entire convention was built around the theme that a thorough knowledge of a dependable product built by a dependable company is one of the most important phases of a successful merchandising program.

With the attendance on the opening day exceeding 350, it was one of the largest refrigerator conventions in the history of the Stewart-Warner Corporation, Charles R. D'Olive, manager of the household appliance division, and chairman of the convention, stated. In attendance were Stewart-Warner distributors from every part of the United States and Canada, factory representatives, district managers and officials of the Stewart-Warner Corporation, dealers from key cities, and 50 refrigerator service managers.

The principle of the Dual-Temp refrigerator, leader of the 1939 line, has been extended to include three models for 1940, each model with a freezing locker for frozen foods. Nine

other models were introduced: two DeLuxe, three Sav-A-Step, and four Standard.

"Quality Lane," the exhibition originally set up for the service managers' section to the convention, became one of the outstanding features of the entire convention, Mr. D'Olive said. Occupying the entire Michigan room, one of the large reception halls in the hotel, it constituted a display in which every component part of each Stewart-Warner model was exhibited in detail and the working processes explained.

Complimenting all appliance men for their courage in undertaking a difficult business, James S. Knowlson, president and board chairman of the Stewart-Warner Corporation, in a straight-from-the-shoulder address, spoke of many of the difficulties that are encountered by all engaged in the appliance business.

Touching on the European war, he took a stand for American neutrality, predicting that 1940 may be one of the most prosperous years for the United States if its citizens continue their clear-thinking and remember that their frontiers are not abroad.

A. B. Dicus, vice president and account executive for Hays MacFarland & Company, Stewart-Warner advertising agency, discussed plans for 1940 Stewart-Warner refrigerator advertising. Newspaper advertising, he announced, is already scheduled for definite publication in approximately 130 key cities.

That a large percentage of all refrigerators sold to distributors by Stewart-Warner Corporation throughout the year are sold in December and January was disclosed by F. A. Hiter, vice president and general sales manager. Using this percentage for a basis, he can, he contended, approximate the annual total sales for any given distributor.

A financing plan for dealers, whereby they will be allowed 90 to 120 days for payment was explained by Mr. D'Olive. The primary purpose of the plan, he said, is to allow distributors to sell to dealers early in the year without delaying sales until March or April.

Cooperative advertising was explained by C. C. DeWees, appliance advertising manager for Stewart-Warner.

Joseph C. Elliff, Stewart-Warner sales and merchandising executive, spoke of the extensive plans for expanding distribution in 1940, and pointed out various ways in which the present distributing organization could increase dealer coverage.

At the close of the convention Mr. D'Olive announced that total orders placed by distributors for 1940 Stewart-Warner refrigerators exceeded by more than 40 per cent convention orders placed a year ago for the 1939 line.

Westinghouse

"Faster for '40" is the theme for 1940 which was announced recently by Frank R. Kohnstamm, sales manager of the Westinghouse Electric & Manufacturing Company merchandising division to Westinghouse distributors at their annual two-day convention December 4 and 5.

The company's 1940 line of household refrigerators, ranges, water heaters and other household appliances was shown to the 150 distributors' executives present at the convention, and the complete 1940 program of advertising, promotion, and sales training was outlined by Mr. Kohnstamm and other Westinghouse officials.

A dramatic presentation of each of the 1940 products was given, by means of skits, motion pictures and demonstrations. One of the features of the meeting was the premiere showing of a three-reel Hollywood-produced motion picture, "Hamlet Goes to Town," designed to sell the advantages of the all-electric kitchen to groups of prospects at cooking schools, woman's association meetings and similar meetings throughout the country. A series of seven new refrigerator technicolor minute movies also were shown.

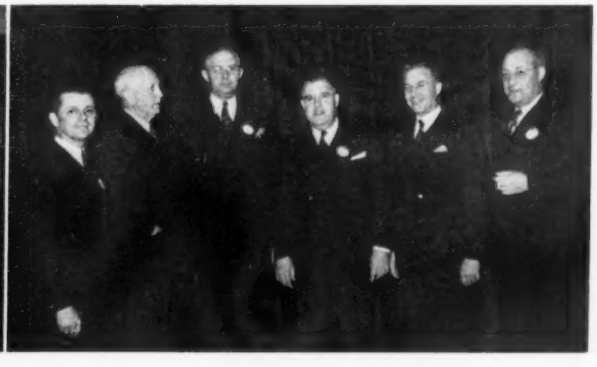
Next year is expected to be one of the biggest years in the merchandising division's history, Mr. Kohnstamm told the distributors. Because of the anticipated sales increase, the division's entire program has been stepped up—with a materially increased advertising appropriation and a more aggressive program on sales training.

High points of the annual convention banquet Monday night were presentation of prizes to four distributors for outstanding range development work and to winning distributors in the fourth annual "Fight Fest," a Westinghouse refrigerator sales competition among distributors which has been conducted over a "six round," three-month period. Winners in the "Battle Royal," one of the features of the refrigerator "Fight Fest" were the following:

E. W. Isenhower, Westinghouse Electric Supply Company, Los Angeles; Glenn Nutter, Moock Electric Supply Company, Cleveland; Gene Cramer, Electric Supplies Distributing Company, San Diego; and Leo Rayhill, Kempf Brothers, Utica, New York.

The range sales leaders were: J. L. Perry, of the J. L. Perry Company, Nashville, Tennessee; C. W. Lehner, merchandise manager of the Westinghouse Electric Supply Company, Atlanta, Georgia; H. I. McConnell, merchandise manager of the Westinghouse Electric Supply Company, Philadelphia, Pennsylvania; and R. L. Brown, merchandise manager of Westinghouse Electric Supply Company, Indianapolis, Indiana. Thirty-five other distributors' representatives were honored and awarded prizes for outstanding refrigerator sales performance in 1939.

The entertainment program at the banquet was presented entirely by Westinghouse employes. Music was supplied by the Westinghouse Swing Band.



The South was well represented at the annual distributors convention of Westinghouse held in Mansfield early in December. Reading from left to right, at left above, are a group of southeastern district representatives in attendance: S. M. Davison, Westinghouse merchandise manager at Atlanta; J. S. Shaw, Moore-Handley Hardware Company, Birmingham; E. L. Fielden, Southern Furniture Sales Co., Knoxville; L. S. Hart, Moore-Handley Hardware Co., Birmingham; W. B. Meek, Monroe Hardware Co., New Orleans; Frank Moore, Jr., Southern Furniture Sales Co., Chattanooga; J. L. Perry, J. L. Perry Co., Nashville; and C. W. Lehner and W. A. Emerson, Westinghouse Electric Supply Co., Atlanta. A group of Westinghouse Supply Company representatives are shown at right above. From left to right, they are E. J. Schaubert, Oklahoma City; G. H. Miller, St. Louis; W. A. Brent, Tulsa; E. A. McDermott, Memphis; and R. G. Berle and W. J. Fritz, both of Dallas.

The Distributors' Convention was the first of a series of three meetings in Mansfield this week. The Westinghouse district sales personnel will remain in the city for an intensive three-day program of sales planning and promotion. On Friday, December 9, the firm will open its First Annual Merchandising School for distributors' salesmen. This also will continue for three days.

A new 5-speed Corox surface heating element was only one of a number of the latest Westinghouse contributions to the science of electrical cookery which were announced at the company's preview of its 1940 range line.

The new Corox unit which is said to be 30 per cent faster and uses 22 per cent less current in cooking operations than famous Corox units of other years, shared honors with other major features of the 1940 Westinghouse range such as new and modern styling, and the "True-Temp" oven—an oven with uniform heat throughout.

Modern styling is carried throughout the entire 1940 range Westinghouse line. The finish is all white porcelain enamel. All models have one-piece platforms and backguards eliminating cracks and crevices. All appointments are finished in chrome.

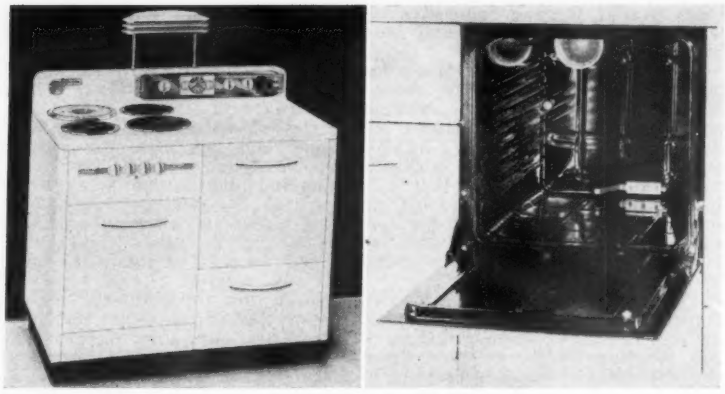
The line is headed by the new 1940 Emperor, a deluxe two-oven model. Ranging downward in price, the next model of the line is the Regent, similar in design to the Emperor but with one oven and a built-in warmer drawer.

The others are the Commander model, with deluxe features, but in a popular price bracket for volume sales; the Champion, a full 38-inch range with a new platform light treatment; the Victor, either with the popular "look-in" door or with a solid door; the Conqueror, a leg-type model; and the Coronet, a three-unit apartment house model, with a full 19½ inch oven.

A noteworthy addition to the Westinghouse refrigerator line displayed at the preview, is an eight cubic foot model that sells for less than $200. This refrigerator is not specially-manufactured, but includes all the refinements in construction of the other Westinghouse models.

The difference in the new model lies in the fact that many of the convenience features found in the more expensive models do not appear. It has been developed, Westinghouse Merchandising Division officials explained, to meet the needs of the large rural market opened up by extension of rural electrification activities.

The True-Temp control, described as the only control on the market which allows the housewife to select a given temperature in the general food area of her refrigerator, was a feature of the higher-priced models only in 1939, but it is used throughout the 1940 Westinghouse line.



Two ovens, one large and one small, are featured in the new Universal range model E1644. Other features of this model are three variable speed units, cooker type deep fry baskets, smokeless broiler grill, and automatic preheat control for oven. In addition to the lamp, this model has a timer in the back flasher, a selector switch for time control of oven or outlets, and a deluxe warming drawer with signal light. At right is the new large roomy Bakefast oven with recessed oven light. It preheats to 400 degrees in from six to seven minutes.

Two models in the 1940 Westinghouse range line, the Emperor and the Regent, have two large capacity ovens instead of one, but the oven of every range in the line has balanced heat, made possible by the new Westinghouse hydraulic thermostat. Exterior beauty and ease of cleaning are not overlooked in the Westinghouse 1940 line of refrigerators which features True-Zone Cold.

Universal

At a group meeting held December 11, 12 and 13 at the Landers, Frary & Clark plant in New Britain, Conn., five new Universal electric range models with several original and exclusive features were introduced to salesmen attending from all parts of the country. A promotional campaign including advertising in national women's magazines, a tie-in with the Modern Kitchen Bureau's national and local program, company and cooperative dealer advertising, radio announcements, direct mail pieces, visualizers and other sales aids was also presented. The 1940 Universal line will be announced to the trade this month.

At the first session of the three-day meeting, W. J. Cashman, Universal's electric range sales manager, stated that 1940 promises to be the biggest year in electric range history. "The electric range is already taking the place of the refrigerator as the biggest profit-builder for appliance dealers and specialty stores," Mr. Cashman declared. "After having won great public acceptance through forceful national and local advertising and extensive promotion by utility companies, the electric range is at the 'cream' stage of development when profits for dealers are largest. The fact that now dealers instead of electric utility companies are making the larger proportion of sales is another indication that the appliance dealer and specialty store owners are in a fortunate position.

At the sales meeting it was pointed out that the new Universal ranges are the result of more than a year's research, engineering and testing. Universal executives and engineers decided that greater speed could be added to the already fast electric

This is going to be a great year for General Electric Ranges

SEE THE LINE AND YOU'LL SEE WHY!

THE CHANCELLOR
Model DD-40

THE SPEEDSTER
Model DP-40

THE MASTER
Model CD-40

THE LEADER
Model CP-40

THE PAGE
Model CL-40

THE STUDIO
Model AP-40

Every One a New 1940 Selling Feature—Every One!

- New CLEAN SPEED 5-Heat Calrod Cooking Units throughout—each with new "Easy-Out" Aluminum Pan.
- New HI-SPEED 5-Heat Thrift Cooker. Gives surface cooking unit speeds!
- New Cooking Chart permanently fused on drip tray for handy reference.
- New Automatic Oven Lighting.
- New "What to Cook" Chart for Thrift Cooker, embossed on Cooker lid.
- New Bright Finish "Stay-Clean" Oven Shelves.
- New DeLuxe White and Chrome Hardware throughout.
- New Self-Indicating White Switch Buttons.

And Exclusive G-E • Tel-A-Cook Lights in Color • Triple-Oven—3 Ovens in One • Broiler Meter • **PLUS many more!**

A COMPLETE NEW LINE OF G-E ELECTRIC RANGES

Backed by Even Greater Advertising and Sales Support!

Heating speed stepped up . . . prices stepped down on the new General Electric Ranges! That's the BIG news for electric range dealers in 1940. And General Electric is out in front again with advanced G-E styling . . . finer quality, better looking ranges . . . self-demonstrating features . . . and *lowest prices in G-E history!*

To top it all a big new national advertising program . . . new, more colorful sales aids . . . and a sensational new point-of-sale demonstrator—"The Cooking Rebus"! Get the complete story NOW from your G-E Distributor. General Electric Comany, Appliance and Merchandise Dept. JR-0211, Bridgeport, Conn.

GENERAL ELECTRIC

NEW Genuine PYREX FLEX GLASS COFFEE MAKER ENTRIES in the 1940 Sweepstakes

TRADE MARK REGISTERED U.S. PAT. OFF.

Narrow Neck Models for Better Pouring

These are the added entries in a race in which everyone wins. Now you have models to meet every demand.

The electric Catalina Model at the new low figure of $6.95 (either black or ivory trim) will win in a walk — It is complete with Anyheet Thermostatic Temperature Control and "self-timing" stove. Packaged in a gold foil gift box.

Wide Neck Models for Easy Cleaning

The Saratoga has removable chrome lower bowl decoration and Moldex trim in black or ivory. Equipped with Anyheet Thermostatic Temperature Control and "self-timing" stove.

In the Bretton Models you have a choice of ivory or black Moldex removable lower bowl decoration and handle. Place your bets on these models.

Pyrex brand glass. All units complete with upper and lower bowl covers and Dippex coffee measuring spoon.

$4.90 OR 17% EXTRA PROFIT FOR THE DEALER

Special Introductory Offer a $2.95 Unit and 3 Ivory Guest Trays FREE when you buy this Sweepstakes Assortment

Retail Value $33.65 - Your Special List Price Only $28.75

OFFER EXPIRES FEBRUARY 29, 1940

BRETTON BLACK KITCHEN MODEL
$2.95 Cat. No. BWK-8-B

CATALINA IVORY ELECTRIC MODEL
$6.95 Cat. No. EI8
Ivory Tray 65c

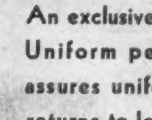
SARATOGA IVORY ELECTRIC MODEL
$6.45 Cat. No. SAE-8-
Ivory Tray 65c

BRETTON IVORY KITCHEN MODEL
$3.45 Cat. No. BWK-8-I
Ivory Tray 65c

BRETTON BLACK ELECTRIC MODEL
$4.95 Cat. No. BWE-8-B

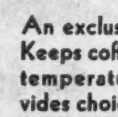
CATALINA BLACK ELECTRIC MODEL
$6.95 Cat. No. CEB-8

Sweepstakes Assortment Cat. No. 1940A — $28.75



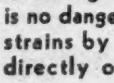
'SELF-TIMING' STOVE

An exclusive patented feature. Uniform period of infusion assures uniform coffee. Brew returns to lower bowl without removing glass from stove.



ANYHEET THERMOSTATIC TEMPERATURE CONTROL

An exclusive patented feature. Keeps coffee at correct serving temperature indefinitely. Provides choice of any heat without variation, regardless of voltage. You simply "dial your heat."



REMOVABLE BOWL DECORATION

An exclusive patented feature. Gleaming chrome plate. There is no danger of setting up heat strains by burning decoration directly on the glass. Heat strains cause breakage. Plain undecorated glass costs less for replacements.

SNAP-IN DETACHABLE DECANTER COVER

A patented feature. Permits easier pouring without lifting cover. And it's out of the way when cleaning the bowl.

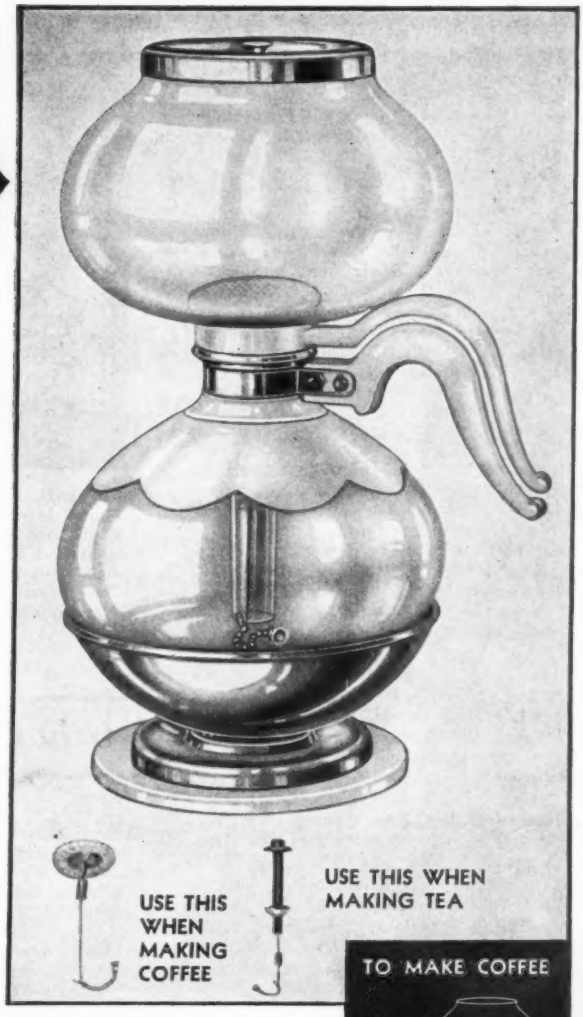
SPRING TENSION FILTER

An exclusive patented feature. No danger of filter falling out or breaking bowl. Perfect flavor and freedom from dregs requires cloth filter. Upper bowl may be inverted when brewing is completed.

UPPER BOWL HOLDER & GUEST TRAY

Invert the upper bowl on this gleaming Moldex tray. Or use the tray for individual serving at buffet parties or for serving cocktails or other drinks.

IT'S HERE



Sensational Single Unit Coffee and Tea Maker

Tea experts laughed when we told them they could make perfect tea in a vacuum type coffee maker. Said they - "It just can't be done. Good tea requires boiling water. Hot water rising from below "bogs" down the flavor. Boiling water must be poured or sprayed over the tea leaves to release their rich delicate flavor."

When we showed these experts the vented upper bowl which forces the water to boil before it rises to the upper bowl and the Tea Spray which sprays boiling water down on top of the leaves, these experts hailed us as wizards. "This", they said, "is the first perfect tea maker produced in 1600 years of tea drinking."

And now we announce a second major triumph. A single unit that is *both* a Silex Glass Coffee Maker and a revolutionary Silex Spray Tea Maker.

The upper bowl of this new unit is vented and is provided with a vent-hole closure. To brew perfect coffee, close the vent hole and use the patented Silex Coffee Filter. To brew tea, open the vent hole and use the Silex Tea Spray.

To introduce this new double purpose unit, it is being offered until February 29th, 1940 at an especially attractive price.

Electric Model (8-cup size black trim) $6.70 VALUE **Special Price $4.95**

All specials are also available in 10-cup sizes and with the new startling ivory trim or in red trim at slightly higher prices.

Kitchen Model (8-cup size black trim) $4.70 VALUE **Special Price $2.95**

The double purpose model is a "natural." And at these bargain prices every family will buy. Profit from this sensational opportunity. Place your order now.

PYREX BRAND GLASS. HANDY UPPER BOWL HANDLES.

TO MAKE COFFEE

Close vent hole by sliding closure up

Use patented coffee filter

TO MAKE TEA

Open vent hole by sliding closure down

Use Silex Tea Spray

THE SILEX COMPANY - HARTFORD, CONNECTICUT

"Creators of the Glass Coffee Maker Industry"

Genuine SILEX GLASS COFFEE MAKER

TRADE MARK REGISTERED U.S. PAT. OFF.

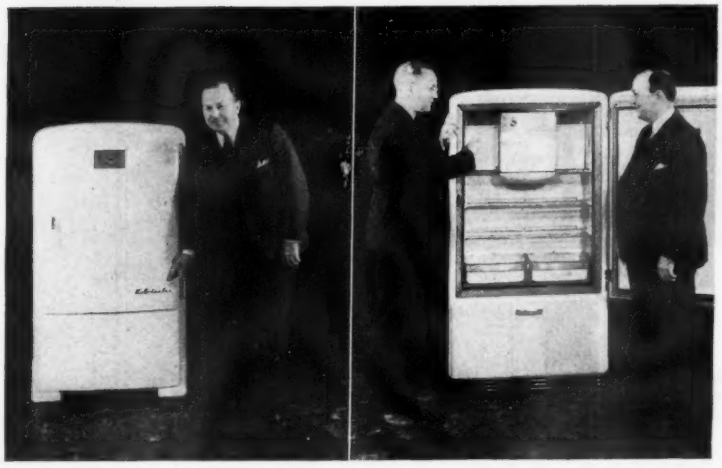
SEE THESE NEW MODELS AT ROOM 907 W, PALMER HOUSE, CHICAGO, JANUARY 7TH TO 13TH

range. They also concluded that it was possible to add flexibility of surface cooking heat to the other proved advantages of electric cooking. The result of this latter conclusion was the "Mult-I-Heat" Control, a surface unit switch that dials over 101 different heats and which Universal executives believe makes 3- and 5-heat switches obsolete. The "Mult-I-Heat" control was subjected to long severe tests under actual conditions in the Universal Test Kitchen and was found to be efficient and durable.

Salesmen attending the Universal get-together were treated to dramatic demonstrations of all the features of the 1940 models. In addition to the "Mult-I-Heat" control, these features include new "Superheat" Speed Units, "Magic Eye" oven control, combining all controls in one, and "Serv-A-Drawer," a novel, thermostatically-controlled warming compartment which keeps foods at serving temperature and permits the homemaker to serve directly from the range to the table. The range itself is said to be the "Nation's Fastest."

Other high points of Universal's sales meeting were a forceful dramatization of a novel "Sell-Up" plan, a sound film emphasizing the major sales advantages of the 1940 models and a demonstration of the "Stop Watch Speed Test," a new "sell-on-proof" idea which will also be stressed in national and trade advertising. Each salesman attending received from the company a new camera with which to "shoot the Universal story for 1940."

Company executives taking part in the various sessions included A. G. Kimball, president of Landers, Frary & Clark, who gave the address of welcome; B. C. Neece, general sales manager; W. J. Cashman, electric range sales manager; D. Shepard and H. E. Metz, who assisted in engineering the five new Universal models.



Frank R. Pierce, general sales manager of Kelvinator Division, at left above, introduces what he calls the Kelvinator "bombshell" for 1940—a six and one-quarter cubic-foot refrigerator that will sell for $119.95 delivered in kitchens anywhere east of the Rocky Mountains and with a five-year protection plan. At right, Chief Engineer L. A. Philipp and Mr. Pierce look over Kelvinator's new "Moist-Master" humidity control system. Two sixes and an eight cubic-foot model in the 1940 line of Kelvinators have the "Moist-Master" feature.

Kelvinator - Leonard

Announcement of the perfection of a new manufacturing and selling plan by which Kelvinator and Leonard electric refrigerators can be sold to the public at delivered prices from $30 to $60 less than 1939 prices was made at the combined conventions of distributors for these two famous brands at Detroit on January 11.

The new program of the Kelvinator Division of Nash-Kelvinator Corporation also brings better margins and better profit opportunities to retailers, it was declared by Frank R. Pierce, general sales manager.

Kelvinator's and Leonard's base price for a big six and one-quarter cubic-foot electric refrigerator equipped with their famous super-powered, hermetically sealed mechanical unit will be $119.95 delivered in the kitchens of purchasers, and with a five-year protection plan, anywhere east of the Rocky Mountains, General Sales Manager Pierce announced.

In explaining how the dual manufacturing and selling program, which benefits both Kelvinator and Leonard lines, was perfected, Pierce told the cheering distributors the following:

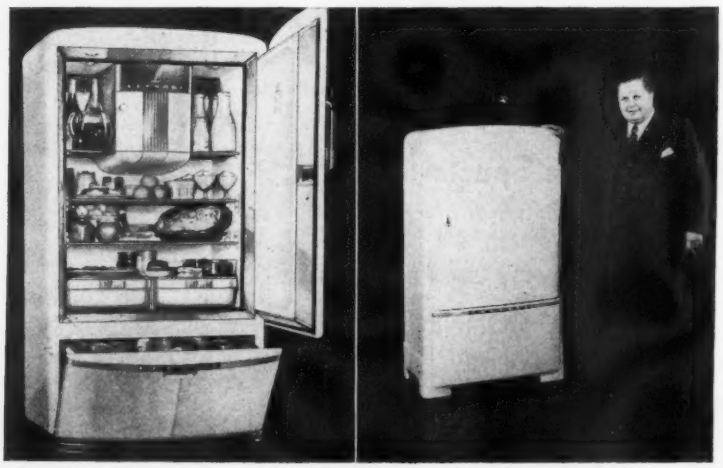
"We've concentrated 96 per cent of our production on six and eight cubic-foot models, which are the size refrigerators people really need, and which they will buy quickly at these new low prices. This brought about important production savings, and permitted us to lower the price some.

"In anticipation of greatly increased sales, we have doubled our production schedules. Here is another production economy, which we have passed on to the public and to our retailers.

"We have cut the cost of selling by working out a distribution plan along the lines of utilizing the most efficient and economical forms of selling in the various markets of the country. This saving from selling costs has also been passed along to public and retailers.

"In addition, we have passed along another slice of the profits to the public and our retailers by reducing our manufacturing profit per unit.

"As a move to further simplify dealers' price problems, we decided



Left, top model in the 1940 Leonard line—a new deluxe eight cubic-foot refrigerator completely equipped and including the new "Hi-Humid" system. At right, George W. Mason, president of Nash-Kelvinator Corporation, stands beside the big six and one-quarter cubic-foot Leonard which is the base price model offered at a suggested price of $119.95.

AS THE PACE OF BUSINESS ACCELERATES
. . . and the modernization of transmission and distribution facilities becomes more and more a matter not to be delayed
. . . the more important it becomes to look upon the production capacity of your wire and cable supplier, as well as upon the technical excellence of product.
GENERAL CABLE
GENERAL CABLE
GENERAL CABLE
GENERAL CABLE
BARE and INSULATED WIRES and CABLES for EVERY ELECTRICAL PURPOSE
General Cable Corporation Sales Offices: ATLANTA • BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT
KANSAS CITY (MO.) • LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • ROME (N.Y.) • ST. LOUIS • SAN FRANCISCO • SEATTLE • WASHINGTON (D.C.)

to pay the freight costs so that advertised prices east of the Rocky Mountains are the actual 'delivered-in-your kitchen' prices (exclusive of State and Local taxes).

"We at Kelvinator looked the problems squarely in the face. The appliance industry, we felt, had reached a point in its progress that made it difficult for the retailer or the manufacturer to make a profit. To bring about a return to sound, healthful conditions, it was imperative that the answers be found to certain fundamentals confronting all retailers, including such things as low price competition, cut-price practices, the trade-in problem, the question of too many dealers, margins which were too short, a profusion of models in practically every line and dealer advertising.

"We are convinced we now have a sound program which fully answers each of these problems, and we expect this program to result in a return to a volume business with adequate profits for our retailers.

Both Kelvinator and Leonard have identical price structures and offer five "Big Sixes" and three "Eights" at suggested prices that include delivery and installation in the kitchen, and with a five-year protection plan.

Newest innovation in the Kelvinator line this year is the "Moist-Master" system, standard on three of the 1940 models—the HS-6 (6.00 cubic-foot), HO-6 (6.1 cubic-foot) and HD-8 (8 cubic-foot). Said to be the most perfect form of refrigeration ever developed, the "Moist-Master" was designed to stimulate the trade-in business, and provide Kelvinator dealers with a real opportunity to get a much larger percentage of this market in 1940.

A new "Hi-Humid" system of controlled humidity, which is said to provide the exact amount of moisture for maintaining original freshness in foods for longer periods of time in uncovered dishes, heads the list of Leonard's numerous 1940 features.

Norge

Norge distributors and their executive personnel went through "an advanced collegiate course" in the profitable operating of wholesale territories and sales management, followed by a post-graduate course in appliance merchandising, sales promotion, and advertising, at the annual convention for distributors of Norge division, Borg-Warner corporation which closed a five-day session in Detroit, December 8.

The convention opened Monday morning, December 4, with the first day devoted to a preview of 1940 models of Norge Rollator refrigerators, ranges, home laundry equipment, and commercial refrigeration. Monday also saw outlined the 1940 Norge advertising and merchandising plans. Norge executives said that the 1940 program, regarding both product and promotion, is the most outstanding in Norge history.

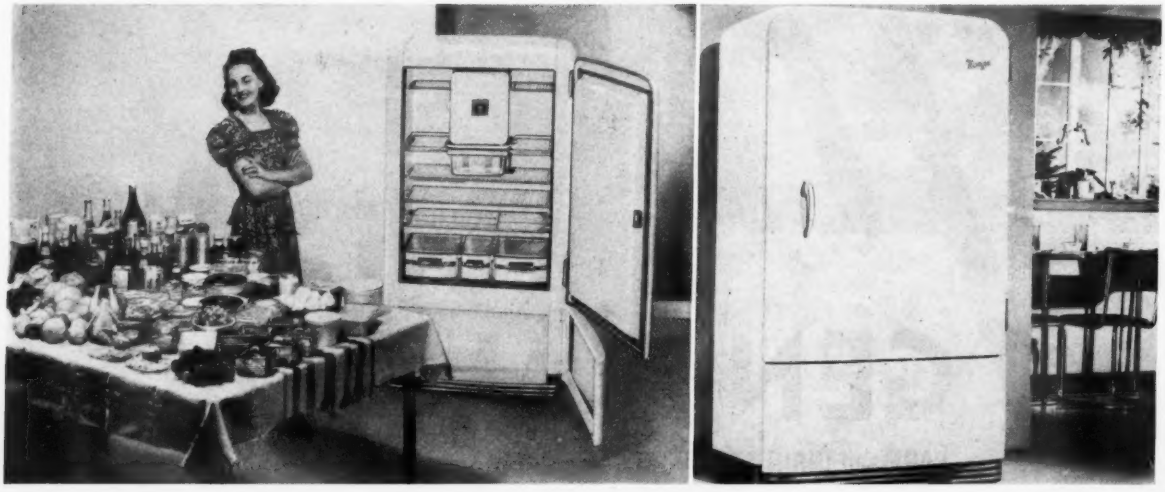
Climaxing the first day of the distributor sessions at the Detroit Players' club, the annual banquet was held Monday night at the Detroit Leland Hotel. There were no speeches at the dinner.

Beginning Tuesday morning, distributors and their executive personnel in attendance went into a four-day Merchandise Clinic at the Leland, a new departure in Norge distributor conventions. The purpose of the clinic, Howard E. Blood, Norge president, explained, was to prepare and equip distributors, and to assist them in preparing and equipping their dealers, to take full advantage of the opportunities 1940 offers.

"There is every reason," Mr. Blood said, "to feel sure that 1940 will offer real and substantial opportunity to the appliance manufacturing and distributing organizations that have the right product to sell, the right tools to sell with, and that will concentrate on making the most of their opportunities.

"We can concern ourselves as much or as little as we choose about international business conditions and the states of peace or war existing through the world. While our sympathies may go out to the people of war-torn nations, and while we may grieve with them over the loss of their homes and their loved ones, we must also sympathize with and understand the desires and ambitions of our own people. They want better homes to live in. Our homemakers want better equipment with which to carry on their daily work. They look to us to help them satisfy these desires. We must not disappoint them."

During the course of the four-day clinic, five well-known "outsiders" addressed the Norge distributors. Tuesday, Arthur Hirose, New York, eminent research authority with the McCall magazine organization spoke on "Facts Worth Remembering." Wednesday, L. E. Moffatt, editor of Electrical Merchandising, New York, talked on "The Refrigeration Market." Thursday, Frank E. Watts,



Here is graphic evidence of the food storage capacity of the 1940 Norge Rolator refrigerator. This tableful of food has been removed from the 8 foot Royal monogram supreme model shown in the picture. At right is an exterior view of the Royal monogram supreme model. An interesting feature of the Norge 1940 Royal 8 foot model is the non-refrigerated storage space provided in the Cellaret. This model provides a maximum of usable storage space.

And G-E Will Do It Again in 1940!

EVEN FINER FOR '40!

It's hard to improve so fine a product as the 1939 G-E Refrigerator, but General Electric has done it for 1940! And in spite of rising raw material costs, prices remain at the same *all-time low* on all popular G-E models.

Even finer styling, even finer features such as Selectrive Air Conditions with *Controlled Humidity*, Stainless Steel Shelves, Air Filter, and Illuminated Control Dial. Even the famed G-E Sealed-In-Steel Thrift Unit freezes more ice faster and uses less current than ever in the popular 8 cu. ft. DeLuxe models.

We paced the field in '39 and *we'll do it again in 1940!*

General Electric Company
Appliance and Merchandise Dept.
Bridgeport, Connecticut.

A FULL Line of electric appliances for the home—G-E Electric Ranges, Electric Sink (with Dishwasher and Garbage Disposall), Water Heaters, Washers, Ironers, Cleaners, Radios, Sun Lamps, Clocks, Fans, Small Appliances. Backed by the combined research, engineering skill and manufacturing experience of the world's oldest and largest electrical manufacturer.

GENERAL ELECTRIC

vice president, Electrical Dealer, Chicago, addressed the meeting on the subject of "The Opportunity Ahead in the Washing Machine Industry."

Friday morning, Thomas H. Beck, president, Crowell-Collier Publishing Company, New York, gave a speech on "Salesmanship," and that afternoon, at the final session of the clinic, Tom McLaughlin, sales-promotion manager, The Saturday Evening Post, Philadelphia, talked on "National Advertising—What It Means to a Sales Organization and How It Can Be Used in Selling Most Effectively."

Final event on the week's program was a late afternoon preview Friday of 1940 Norge products for editorial and business representatives of both the trade and consumer press, followed by an informal dinner in the evening at which Mr. Blood, M. G. O'Harra, vice president in charge of sales, and J. A. Sterling, general merchandise manager, were the hosts.

The 1940 Norge is presented in four series, the Royal Monogram Supreme (top models), Royal Monogram DeLuxe, Royal Monogram, and Royal Viking. There are three models in the Supreme series, with rated capacities of eight, six, and five cubic feet; three like-capacity models in the DeLuxe series; two in the Monogram, a six and a five; and four in the Viking series, two sixes, a four, and a three.

More usable and accessible food storage space—as much as 14.4 per cent more in some models—has been built into the 1940 Norge Rollator refrigerators, to answer the demand of women throughout the country for bigger capacity home refrigerators. This extra interior space, achieved without increase in exterior dimensions, and forty-two improvements and refinements, are the features of the new Norge models.

Among the forty-two new improvements and refinements throughout the line are a new freezer door design with a new door handle, new cold control panel, larger Ice-O-Bar, new, lowered floodlight location (beneath the Coldpack), new floodlight guard, new shelf guard rails, new Hydrovoir front, larger door hinges, new sliding dairy and egg basket, new fruit basket front, new white shelf studs, and a new interior color scheme (gray throat lining, supplanting the former black), and chrome and blue nameplates on freezer and food baskets.

Gibson

At a series of four regional meetings held in Chicago, San Francisco, Atlanta and New York, the Gibson Electric Refrigerator Corporation, presented the new 1940 Straight Line of Kookall Electric Ranges.

The line is made up of 5 models which can be expanded by the dealer into 20 different models by use of three available sets of optional accessories which can be installed on any one of the five basic models.

The Gibson Straight Line of electric ranges eliminates the need for a retail salesman to explain differences in structural design or oven sizes. Every Gibson model, from the lowest to the highest priced, has the same basic one-piece all-steel structure, and the same basic advantages for complete cooking service. Overall dimensions: height, 40½"; width, 39⅜"; and depth, 25½"; oven dimensions: height, 16"; width, 16"; and depth 20"; are the same for all models. Every model is flush-to-floor and flush-to-wall and has an all-porcelain exterior with an acid-resisting porcelain surface. All models have the same one-piece, all porcelain oven with two elements; 5 cubic feet of storage space, 5 speed Chromalox surface elements, a slanting Eye-Angle instrument board, a Service-from-front instrument panel, a pretested oven control, and a 5 position smokeless broiler.

Model ER-390-H the quality price leader, in addition to these basic advantages, has a pilot light over the oven control and is the only model with four 5-speed Chromalox surface elements. Each higher priced model has a definite extra-use and extra-value for its step-up. ER-390-I has a 6 qt. 660 watt deep-well cooker. ER-390-J has a 5-speed, 6 qt. Kookall Kettle with a 1500 watt Chromalox sealed element. ER-390-K has a Storage Cabinet with Gliding Storage Tray, and 2 sliding storage drawers, pilot lights over the Kookall switch, surface switches and the oven control, and the Kookall Kettle on this model is equipped with a French Fry Basket.

ER-390-L has the Kookall Kettle equipped with the French Fry Basket and also a Pudding Pan, the new Gibson Steamall which gives the Kookall a 10 qt. steaming capacity. It also has an improved 500 watt warming compartment, pilot lights over all switches including the warming compartment switch, and two roller bearing storage drawers.

News About People—

In line with the recent consolidation of all of the General Electric Company's appliance operations at a single location in Bridgeport, Conn., **H. L. Andrews,** vice president and executive head of the company's appliance and merchandise department, has named **George Chapman** and **Carl M. Snyder** assistant managers, effective immediately.

George Chapman

Carl M. Snyder

Mr. Chapman, who has had 26 years of experience in G-E lamps and appliance activities, will assist Andrews in his new capacity in the administration of the appliance division, which includes the design, manufacture, and distribution of electric refrigerators, ranges, water heaters, dishwashers, disposals, electric kitchens, home laundry equipment, clocks, cleaners, fans, heating devices, and miscellaneous appliances.

Mr. Snyder will henceforth be responsible for sales and sales activities of the same line of products, together with radio and television receivers and tubes. Both men will make their headquarters at Bridgeport.

* * *

R. W. Turnbull, vice president and general sales manager, Edison General Electric Appliance Company, Inc., Chicago, (The Hotpoint Company) has just announced the appointment of **C. J. Prashaw** as manager of the company's Dallas district.

C. J. Prashaw

Mr. Prashaw succeeds **J. T. Nee,** who has been transferred to the Atlanta district, as Hotpoint electric range specialist.

* * *

W. C. Noll has been appointed manager of product service for the General Electric appliance and merchandise department, Bridgeport, Conn., according to an announcement by **H. L. Andrews,** vice president. In this

post he will co-ordinate and be responsible for service on all products of the department, as well as for the operation of all field service shops handling G-E appliances. Mr. Noll has been with General Electric Co. for thirty years.

* * *

With the promotion of **A. L. Jones** to the position of manager of the central station department of the southwestern district of the General Electric Company, with headquarters at Dallas, Texas, **Earl F. Patterson** now becomes manager of the Tulsa office.

* * *

W. O. Jaudon, sales representative for many years with the Bryant Electric Company, died December 14, 1939. Mr. Jaudon was well known throughout the Southeast, having made his headquarters in Atlanta for many years.

* * *

Appointment of two new department sales managers and four new regional managers for Norge Division Borg-Warner Corporation, Detroit, is announced by **M. G. O'Harra,** vice president in charge of sales.

E. R. Bridge, former regional manager, has been named sales manager for the washer, ironer, and space-heater department. **Paul Puffer,** former regional manager, becomes sales manager of the refrigeration department.

The four new regional managers are **William H. Hanna, Harry Lewis, R. H. Pizor, Ray C. Roy.**

American Tung Oil Now Used in Insulating Varnish

Chinalak insulating varnishes have been manufactured and marketed by the John C. Dolph Company for over a quarter of a century. These insulating varnishes, which have been used successfully by all branches of the electrical industry, are formulated with china wood oil.

For many years, Dolph technicians have searched for a satisfactory substitute for this oil. They are convinced, however, that so far no other oils have been produced that can duplicate exactly the features of china wood oil. The reason that motivates all this research work is the fact that the supply of imported china wood oil in this country is so erratic. Natural catastrophies and disturbances in the Orient have caused the supply of oil to be unsteady in the past. Today, with the Sino-Japanese conflict in progress and with the existing international complications, the oil is still harder to obtain.

In view of these conditions which cause the supply of china wood oil to be cut off periodically, considerable experimentation has been conducted in this country in an attempt to grow Tung trees in the U. S. A. Since 1908, when the first tree was planted near Tallahassee, Florida, much progress has been made and today many groves are producing nut bearing trees.

Among the many advantages of the American grown Tung oil are greater purity, uniformity and greater freedom from acid. This oil is produced with modern machinery which is in contrast to the crude hand presses used by the Chinese. The superiority of the American grown oil has resulted in a price premium in favor of the domestic product.

The John C. Dolph Company has investigated the adaptibility of American Tung oil to its insulating varnishes. It was found that the change of oil does not affect the qualities of Chinalak insulating varnish and has arranged to use American Tung oil exclusively in future shipments of Dolph's Chinalak.

Business Trends

(*Continued from page* 11)

1. The problem of tax revision is a real one. "A continuation of deficit financing is in prospect unless curtailment of governmental activities is undertaken, or extraordinary taxes are levied to meet the cost of preparedness."

2. A rise in prices and cost is a potential hazard. The author states, "So far, costs have been kept reasonably in line by the threat of investigation by anti-trust actions, and by the sincere effort of business to keep cost and prices within reason."

3. There is a possibility of, "a shortage of skilled labor as the expansion continues and as rises in the durable goods fields drain the reserve of the labor forces of its skilled craftsmen."

An indication of the advances made in 1939 are presented by the National Electrical Manufacturers Association's indexes which are felt to be indicative of the forward trend. Motors and generators advanced 50%; industrial materials, 52%; transmission and distribution equipment, 53%; major electrical appliances, 27%; domestic electric household refrigerators, 50%. Other individual products are stated to have rises ranging from 5 to 90% over experience of 1938.

The volume of business obtaining in 1939 is estimated to have been approximately 30% over that experienced in 1938. It is considered that most of this improvement is due to the rise in general business activities, rather than to large war orders. A check on this assumption is indicated in the first quarter of 1940, "at which time marked cancellations would tend to show that some of the spectacular rises of the fall months were engendered by anticipation of war orders and price rises that have as yet failed to materialize."

In conclusion, "1939 saw an improvement in the inventory situation. Orders and production are markedly up and closely in line as the year closes. General business made an extensive recovery, a continuation of which is expected to continue through 1940. The national defense demands for 1940 should tend to stimulate business, with the electrical industry obtaining its share. National advertising, so successful in 1939, will be pushed with continued vigor."

Connecting Diagrams for Lap Wound A-c Motors

(*Continued from page* 30)

winding, and then all those of opposit polarity are connected together counter-clockwise.

Of the two types of connections, the short jumper is used the most and is considered standard as it offers more advantages. Among these are the following:

One main advantage of the short jumper is that the coil leads can be used for jumpers. This reduces the amount of copper used and results in fewer soldered joints, since there is only one joint between two pole phase groups.

The short jumper connection with parallel windings offers better electrical or magnetic balance and permits the use of equalizing jumpers.

For maximum equalizing action, the short jumper parallel connections, such as shown in Figs. 4, 5 and 6, August 1939 issue, are arranged so that the groups in one leg are mechanically opposite one another.

With short jumpers, the only cable used in connecting up the winding is for leads and star jumpers.

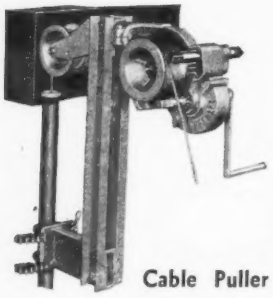
The short jumper connection is easy to check and follow through as the winding progresses from groups 1 and 3, or 1 and 4, without reversals.

The long jumper connection has one advantage and that is that jumpers can be arranged neatly. However, with the long jumper connection, the jumpers must be made with cable, and each jumper will require two soldered joints, thus this type of connection is more expensive.

The next article will present the three parallel, four and three lead, six-pole connections, and will discuss the use of equalizer connections with short jumper connections.

Greenlee TOOLS

TIMESAVERS and PROFIT-MAKERS FOR THE CONTRACTOR



Cable Puller

No longer is it necessary to use cumbersome, heavy equipment for pulling in cable. The Greenlee anchors right to the conduit through which the cable is to be pulled and is easy to handle and simple to operate.

Knockout Tools

Greenlee Punches and Cutters make it easy to enlarge holes in switch boxes, cabinets etc. They form clean-cut holes quickly and accurately, without reaming or filing.

ASK FOR CATALOG NO. 31E if you don't have a copy. It shows these tools as well as others of interest, such as Hydraulic Conduit and Pipe Benders, Joist Borers, Hydraulic Pipe Pushers and Electricians' Bits.

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1707 Columbia Ave.
ROCKFORD ILLINOIS

GREENLEE TOOL CO., 1707 Columbia Ave.
Rockford, Illinois

Would like information on _____

_____

☐ Please send a copy of Catalog No. 31E.

Name _____

Street _____

City and State _____

My Jobber is _____ ES-1-40

Refrigeration Superheaters

(*Continued from page* 29)

unit. Naturally, the reduction of the refrigerant losses mean that the equipment can handle that much more controlled load.

We know that liquid leaving the condenser contains a certain amount of heat and we determine it's quantity from the temperature of the liquid. Ordinarily, the liquid enters the point of expansion with very nearly the same heat load and temperature as when it left the condenser. Immediately upon expanding, a certain portion of the liquid must be evaporated in order to cool the balance of the refrigerant down to the evaporator temperature. Therefore, the refrigerant used for this purpose is lost in so far as cooling the evaporator itself is concerned. But when a super heater is used, the incoming liquid refrigerant is partially cooled, and a part of the heat load is removed by its coming into contact with the cooling suction gas, thereby reducing the amount of evaporation necessary in the cooling coil to cool the liquid down to the temperature of the cooling coil. As a result, for a given capacity over a given period of time, a less amount of liquid is handled because the suction gas would be heated on its return to the condensing unit, whether the superheater is used or not. Therefore, a net capacity gain is accomplished both in the condensing unit and the expansion valve.

The use of a superheater reduces the amount of superheat that is required in the expansion valve adjustment in order to prevent sweating, so that there is a less critical adjustment required of the expansion valve. Another advantage is that the use of the superheater prevents the slugs of liquid refrigerant from getting back to the condensing unit, thereby eliminating liquid slugging and the consequences following it. Also, since the temperature of the suction gas is raised above the dew point of the air surrounding it, there is no necessity of insulating the suction line from the discharge of the superheater to the condensing unit in order to get away from the dripping of condensation from the suction line. If a suction line did sweat after the installation of a superheater, it would be an indication of a bad adjustment of the expansion valve, and the expansion valve should be adjusted so that the flow of refrigerant would be restricted just enough to overcome this. Otherwise, the purpose of the superheater would have been defeated.

Choosing the correct size of superheater is important. Excessive pressure drops between the condenser and the superheater inlet connection may cause vaporization of some of the liquid in the liquid line. If they are fabricated in the field, they should be carefully figured by an engineer. More and more of the manufacturers are making them standard equipment on all their larger coils.

In the field, they may be fabricated by running the liquid line on the inside of an outer tube, the suction gas flowing in the area between the inner and outer tubes in the counter direction. To make one of this type, it is necessary to have special outlet tees for use at each end of the superheater.

There is another type of superheater, known as the drum type, which may be purchased already completely constructed and ready

to install. It lends itself very nicely to those installations where the distance between the cooling coil and condensing unit is limited and where the physical limitations of the space in which the equipment is being installed prevents the use of the field fabricated type. In most cases it may be necessary to insulate the drum type superheater in order to eliminate the nuisance of sweating.

The value of superheaters are recognized more every day, and undoubtedly they will soon be a part of every installation. The manufacturers of some domestic refrigerators today solder the liquid and suction lines together, paralleling them as much as possible, and in so doing they have made a simple heat exchanger serving the same purpose.

Electrical Heating Found Practical

(*Continued from page* 25)

made economical and unless it is used in a well constructed home.

"Five or six homes are under construction here now that will be heated electrically. The majority will be much smaller than the Reich home. The cost in most of them will be $40 to $80 per year."

But even before the first all-electric home in Knoxville, there were such homes in TVA's widely-known model town of Norris, 25 miles north of Knoxville, and at other points.

Extensive studies in the electrical heating of small houses were made at Norris and later at Hiwassee Dam community in North Carolina.

These experiments showed that the sensitive element of a thermostatic control needs to be well protected from the influence of local radiation in order to function uniformly in mild and severe winter weather.

A large school, a store building and a small office building in Norris are also heated electrically. The heating system at the school uses distribution of heat from a central blast heater through a system of sheet metal ducts. Automatic control is provided from one thermostat located in the warm air supply duct, and three room-type thermostats. The room-type thermostats control dampers in the main trunk ducts to regulate the quantity of air delivered to the three zones of the building. The quantity of heated air admitted to individual rooms is manually controlled. The thermostat in the warm air supply ducts controls the temperature of the air delivered through the ducts by governing the operation of the central electric blast heater. This heater has a capacity of 540 kilowatts and is divided into ten circuits, of which two are 90 kw each, and eight are of 45 kw each. It is controlled by the operation of a circuit selecting switch which closes heating circuits as required by the duct thermostat.

Humidity is regulated by a humidistat, located on a corridor wall, which controls the operation of a steam generator. This generator has electric heating elements. It discharges live steam into the supply duct as required to maintain humidities demanded by the humidistat.

Fresh air is admitted through a separate fresh air duct which discharges into the return plenum. Dampers are provided in the fresh air duct and in all return ducts, so that the air delivered through the heater to the occupied spaces may be all fresh, all return-air, or mixed in any desired proportions.

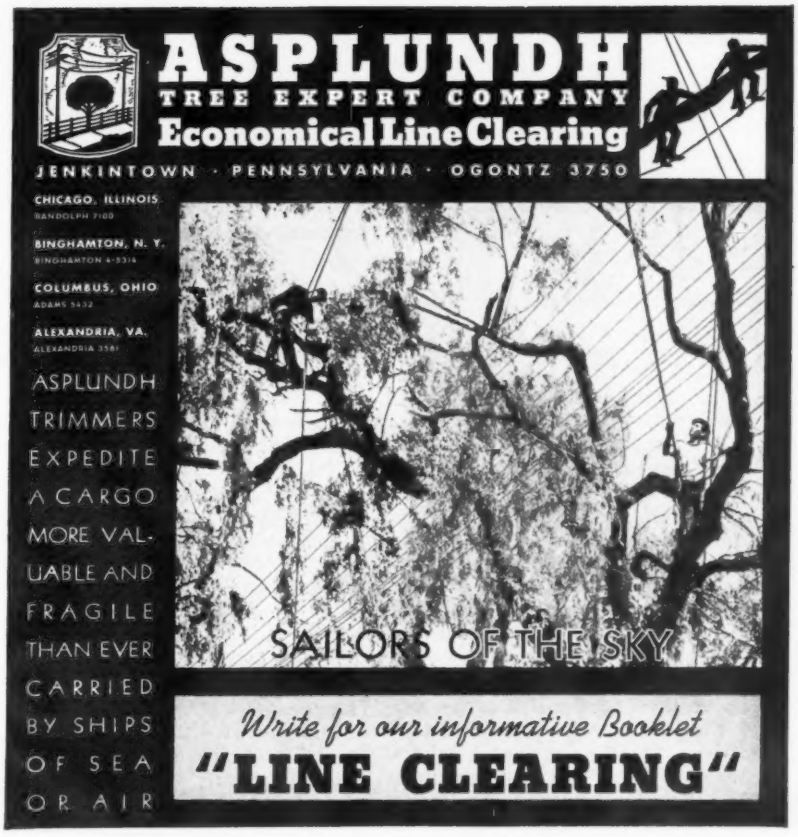
The capacity of the heater is sufficient to carry all heat loads for continuous operation. The school's system, in general, provides a satisfactory and uniform method of heating and a positive and easily controlled method of humidification. At the Norris store and the office building the electrical heating is also giving satisfactory results.

Labor Shortage Forestalled By Apprentice Training

(*Continued from page* 23)

take hold of the practical side of the work in apprenticeship.

"Both industry's and labor's problems can be easily solved in the single operation of creating and maintaining a first class apprentice education system," commented a Louisville contractor. "By making the educational requirements really rigid, the misfits and inept applicants are weeded out quickly, and only those with real ability and real desire to enter the field stick out the full required course. This prevents overcrowding; at the same time it insures the industry of a constantly turn-



ing supply of new blood in the industry, and that the new entrants to the field will be completely trained in the beginning. Cooperation of union and industry with the existing vocational education facility is what it takes: if there isn't any such facility, one should be established somehow."

Southern Regional Wiring Conference

(*Continued from page* 21)

Orleans Public Service.

He emphasized the opportunity for adequacy promotion that would result from the introduction of the new thin-wall insulation for rewiring old buildings. One trial installation utilizing these materials is already underway, he explained, and his company is so intensely interested in this work that one man has been assigned for full time work with local inspectors and the Louisiana Rating and Fire Prevention Bureau. In the course of the discussion following Mr. Avegno's presentation, it was brought out that 6,500 fixtures rated at 300 watts or above had been sold to the commercial market in New Orleans during the past year.

Considerable interest was exhibited in the discussion of Certification Plans led by Buford H. Martin, former president of the Electric League of Chattanooga, and now associated with TVA. The real success of the adequate wiring program will depend upon the effort made to sell the public—the homemaker and housewife—on the comfort, convenience and safety of electrical living, he said. The problems discussed here in this meeting, as to how best to interest the electrical cotractor and the architect in this program, will be with us until we have created an acceptance and a demand for adequate wiring on the part of the public.

Discussing the origin of the "Red Seal" certification plan in Toronto seventeen years ago, Mr. Martin pointed out that in this period only 35,000 homes had been certified, although many more undoubtedly had been built. Other leagues which have only recently begun certification need not feel bad about the small number of homes actually certified, he said, for there is every indication that such activities have an actual effect on many builders not directly contacted.

Much credit for the success of the program now in operation in Charlotte, was attributed by Norman Tindal, of Duke Power Co., to the wide range of promotional materials now available from the National Bureau. Not only has the Charlotte Bureau distributed literature to those more directly concerned in the home building field, but they have also distributed such booklets as "Copper in the Home" to people influential in the building field such as bankers, etc. Wide use of literature and the adequate wiring seals has been made in Charlotte and it is anticipated that every electrical service truck in the city will soon be equipped with promotional signs and banners.

Among the officials of the National Adequate Wiring Bureau present at the conference were O. C. Small, secretary of the Bureau, and manager of the business development department, National Electrical Manufacturers' Association; and the field representatives of the Bureau, A. C. Tait and A. E. Schanuel. Mr. Small was guest speaker at a formal luncheon sponsored by the Electric Association of New Orleans on the last day of the conference. His subject was "The Electrical World of Tomorrow."

Appliance Improvements Lower Sales Resistance

(*Continued from page* 17)

load-building appliances. If you count the kilowatt hours used for heating water over and above the hand-washing methods, we find the *dishwasher is a far better load builder than the modern refrigerator*—530 kwh per year compared to 420 kwh per year or less. Here's a load worth going after!

The modern dishwasher really washes dishes and leaves them hygenically clean. If ever an appliance received the benefits of the new method of development, this one has received it—and will continue to receive it. We use special flow meters, pressure gauges, stroboscopes, fluorescents, and every trick we know about in studying impeller action. Because the impeller works in a combination medium of water and air,

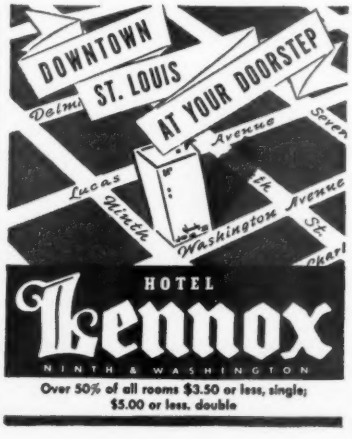
Time
Money
Lives

MARSHALL'S LINEMEN'S SHIELDS save time because they are made in one piece, and can be quickly and easily placed.
Wear resisting rubber compound alternated with specially constructed canvas jacket assure long life as well as protection.
During the quarter of a century MARSHALL'S LINEMEN'S SHIELDS have been on the market, there has never been a loss of life among its users, and over 1000 utilities have now standardized on them.

LINEMEN PROTECTOR COMPANY
1744 W. Alexandrine, Detroit, Mich.

MARSHALL'S
LINEMEN'S SHIELDS

"I'm at hotel
Mayfair"
CENTER OF ST. LOUIS BUSINESS
"Fine, that's near my office"
Over 50% of all rooms $3.50 or less, single; $5.00 or less, double



there are few if any helpful facts on record, except those determined in the development of this appliance.

The first dishwasher patent was taken out in 1848, and many a gallon of water has passed over an impeller blade since then. The dishwasher *without* the kinks is here. It's an A-1 appliance right now. Get set for it. Of course, it will be improved along with all electrical devices but right now it deserves your support. This dishwasher isn't the result of haphazard development, but like other appliances, it can be polished up and the produce further refined. Its present stage of development is backed by honest research. Out of development by research, confidence is born.

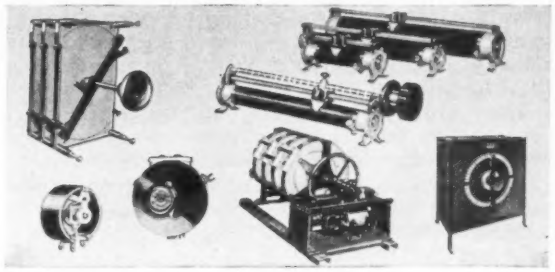
What probably interests the appliance salesmen as much as anything else, today is *price*. The why of this is difficult sometimes to understand, with commissions as low as they are. Nevertheless, there is an increasing pressure for reduction of prices, and therefore costs. The pace-setting engineering groups of which we have been speaking, all work hard to reduce costs, but on a basis they consider legitimate. The difference betwen the legitimate method and the illegitimate method (if we may call it that) is *quality*.

The pressure groups are advocating reduction of costs by the illegitimate method, which means the sacrifice of quality. To engineers, they do not seem to have the experience nor the foresight that shows this policy leads to one result, which is failure of the main objective. That objective is a satisfactory and an enduring business.

It would be easy for costs to be reduced — very easy. Manufacturers could make shoddy merchandise, which would look good, and have as many bells, whistles, et cetera, as required to make it sell. To do this, however, manufacturers would have to skimp on vital materials, inspection, development, and other quality factors. Perhaps a considerable number of these appliances would be sold by a group of expert salesmen. Within several years, if this continued, the rickety "ladder" would surely break—pulling down with it not only the salesman, but the entire major electrical appliance industry.

The legitimate method of reducing costs is far different. Costs have been reduced steadily during the years, but appliances today are many times better in every respect than they were a few years ago. This has been accomplished by a carefully planned program of research engineering, working toward definite ends—the only method which will keep this business satisfactory and enduring.

Send for Bulletins



A RHEOSTAT LINE THAT IS COMPLETE

The bulletins on Ward Leonard Rheostats are probably the most complete compilation of Rheostat data ever assembled by a single manufacturer. Besides types and ratings the subjects of manual and motor drives, mountings and accessories are completely covered. Send for a complete set of the latest Ward Leonard Rheostat Bulletins.

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Brance-Krachy Co., 4411 Navigation Blvd., Houston, Texas

Electron Engineering Co., 1811 Mason'c Temple, New Orleans, La.

Mr. Allen Stanwix-Hay, 2132 Myra St., Jacksonville, Florida

A. L. Pollard, P. O. Box 1452, Knoxville, Tennessee

WARD LEONARD ELECTRIC COMPANY

37 SOUTH STREET MOUNT VERNON, N. Y.

Electric Controls Since 1892

Successful Home Shows

(*Continued from page* 15)

each side and with plenty of aisle room remaining. All booths are exactly the same in area, taking up approximately 197 square feet of space.

The total cost of the show is figured and the cost pro-rated among the exhibitors on a basis of so much per square foot. The individual exhibitors pay for their space with the filing of the application, and the allotment is made in order of filing of applications—first come, first choice. All monies are paid into the company, and the company pays all the bills.

For several weeks preceding the show, or as soon as the plans have been approved and the applications for space filed, the company turns over its billboards, much of its newspaper space, and other advertising media to show promotion. In addition our Mr. Gauthier serves as show manager, making all arrangements, handling all details, supervising expenses, paying bills, and taking care of the "clean up" work when the show is over. These activities constitute our part in putting on the show.

As an attendance builder, and to provide added interest, we arrange a program of entertainment which is offered each night at eight o'clock, and continues for approximately a half hour. Supporting this entertainment is a What's What program, which is similar to the question and answer programs so popular on the radio at the present time.

Three of these What's What programs are featured each night, being broadcast when time is available on the air. They consist of questions concerning the booths and products of the firms participating in the show, and cash prizes are awarded for correct answers. On the first two programs prizes

total $15, while it is $20 on the third. As a rule, they will not last over 15 minutes. However, if answers are hard to get, as will occasionally happen, they will run a little longer.

They are enthusiastically encouraged by the exhibitors, however, since they bring the booths and products show directly to the attention of those present at least once each night; and that goes over big.

There are a number of details to be considered in the planning of a show that might easily be overlooked and which, because of their importance, it is advisable to itemize. They are:

1. We carry a blanket insurance over everything but the booths. These, and their contents, are in the hands of the individual exhibitors.

2. Several firemen and policemen must be employed. The firemen help on the door and are present in case of a fire to avert panic and furnish quick action. The policemen direct traffic and are available if any unpleasantness should arise.

3. It is the accepted practice in all public buildings to use only union labor. This includes electricians for installation of lights, operating spot-lights, etc., and stage hands where entertainment is featured. These men are competent and relieve any worry on this score.

4. Many states, and the federal government, have entertainment taxes. This point should be covered and provision made in computing the total cost. Also check for other taxes.

5. Provision should be made for furnishing refreshments — sandwiches, pie, cakes, coffee, cold drinks, etc. This is an activity that may be leased out on a flat rate basis, the revenue, together with that from the sale of tickets, going into the general fund.

6. Any theater manager can probably put you in touch with a party who will arrange the entertainment and put it on for a lump sum, including payment of entertainers. This will eliminate much detail. It is suggested, however, that the program of entertainment and a rehearsal be approved in advance to insure full satisfaction.

7. Identification badges must be provided for firm heads, their salesmen, and others taking an active part in the show.

When all plans possible have been studied and provision is made, a meeting of the heads of the firms representing the different lines participating in the show, is called. The little fellow must be invited to attend with the man doing a big volume. Those who express a willingness to take part then elect a committee. This committee, working with Mr. Gauthier, makes and approves all plans.

While there is much work involved in the promotion of one of these shows, such must be expected if good results are to be attained, and the results of the shows we have sponsored have amply justified the efforts put forth.

Cash Register Symphonies From Traffic Appliances

(*Continued from page* 13)

more quickly will she purchase a new waffle iron when she does realize this? What easier way of explaining them is there than for the store to actually display and demonstrate several of these uses at the point of purchase?

During the last year, we have all heard a great deal about the electric roaster. Puzzling to some is the fact that electric roasters seem to sell well in some areas and not so well in others. No doubt many of you have asked why. There can only be one reason. An analysis of national roaster sales proves it. The places where roasters are selling well are those places where the uses and benefits of owning an electric roaster have been sold. It doesn't make any difference what price you put on the roaster, what deal you offer to the public or how much pressure you put behind roasters in a roaster campaign, you won't sell enough to wad a gun unless you first sell the uses and benefits of electric roaster cooking.

Lest the emphasis placed upon the necessity of selling uses and benefits be misunderstood, I repeat: The want must come before the sale. After the want has been created, the stimulation of price, terms and bargain offers is frequently the extra push needed to close the sale and the smart merchandiser knows this well.

BIGGER PROFITS
BETTER PRODUCTS

1. *Wire-Nuts.*—"Solderless—tapeless Wire Connectors." Skin wires — Screw on — *That's All! One size* for all common wiring joints. Fully Approved. MILLIONS IN USE!
2. *"E-Z" Wire Strippers.*—Strips the *toughest* insulations without nicking or cutting strands. Strips solid or stranded wires from No. 30 gauge to No. 5 .
3. *Cable Ripper.*—Easily and quickly rips non-metallic sheathed duplex or lead covered cable.
4. *Joist Boring Machine.*—Ends tiresome and dangerous reaching. Bores at any angle—reaches up to 11 ft.
5. *Fuse Clip Clamps.*—For Ferrule or Knife type clips. Seven sizes.
6. *Fish Tape, Reel & Puller.*—*NOW* fishing *IS* a pleasure. Keeps tape reeled up—no expensive tape breakage—no "live" contacts. NEW! "Junior No. O" size—$2.50. Easily fits in tool kit.
7. *Test-Lite & Fuse Puller.*—Tests live circuits. Pulls fuses.
8. *Fuse Reducers.*—Stop over fusing. Many sizes.
9. *Fuse Pullers.*—Laminated fibre, four sizes.

IDEAL SOLD THROUGH JOBBERS

Electrical Products Division
IDEAL COMMUTATOR DRESSER COMPANY
1017 Park Avenue Sycamore, Illinois

SUPERIOR NAIL KNOBS

Approved by National Board of Fire Underwriters. Real leather head washer; extra heavy cap; positive grip wireways; new Code base; steel spring washer; and 12d cement coated nail.

SEND NOW for newest literature including low price lists.

SUPERIOR PORCELAIN CO.
Box 669 Parkersburg, W. Va.

SUCCESSFUL refrigerator dealer desires wholesale connection with some manufacturer on commercial and household refrigeration. Territory approximately 25% saturated. Address Box 65, care ELECTRICAL SOUTH, Grant Bldg., Atlanta, Ga.

MANUFACTURERS REPRESENTATIVE covering Southeast States needs additional lines. Reply to Box 62, care ELECTRICAL SOUTH, Grant Bldg., Atlanta, Ga.

70 MASTER-LIGHTS

"A Master-Light For Every Need"

ANNOUNCING TYPE "F5"

YOU OWE YOUR MEN THE BEST

FASTER—BETTER LINE REPAIRS

F5—Mile Range—
13" high
ONE of 70
Master-Lights

Portable hand searchlights for repair, inspection and emergency crews. Most powerful, sturdy and lightest weight made. Many dry and rechargeable battery types.

MANUFACTURERS OF WORLD'S MOST POWERFUL AUTOMOBILE HEAVY DUTY ROOF MOUNTED SEARCHLIGHTS. MADE SPECIALLY FOR REPAIR AND INSPECTION CARS.

Buy Direct From Manufacturer—Lights Sent On Approval

CARPENTER MFG. CO.

188 SIDNEY STREET—CAMBRIDGE, MASS.

Dolph's SYNTHITE

(Reg. U. S. Pat. Off.)

No. 153

CLEAR BAKING VARNISH

For *High Speeds!*

Here is a new insulating varnish to meet the requirements of modern high speed work. DOLPH'S SYNTHITE No. 153 Clear Baking Varnish is a synthetic gum base grade especially developed for use on vacuum cleaner, portable tool and other high speed armatures. When thoroughly baked, this grade binds the wires into a solid mass preventing any chance of movement at high speeds.

Check our claims for SYNTHITE No. 153 at our risk. Mail the coupon today and order a trial gallon. Your order will be shipped subject to the DOLPH Guarantee that if the material does not prove satisfactory, it may be returned and the full amount charged will be refunded immediately.

MAIL THE COUPON TODAY

JOHN C. DOLPH COMPANY
166 Emmett Street
Newark, New Jersey
Please ship us, subject to the DOLPH Guarantee, 1 gallon of Synthite No. 153 Clear Baking Varnish at $2.30 per gallon.

Name .....

Address .....

City ..... State .....

DINKLER HOTELS

Landmarks of Southern Friendliness

You will find the Dinkler Hotels located conveniently on all principal highways in the South . . . in each you will find a cordial welcome by a cheerful, friendly staff. The rooms are large and well ventilated . . . each with private bath and radio . . . garage connections are convenient and popular prices prevail in dining rooms and coffee shops.

★ The ANSLEY IN ATLANTA, GA.
★ The SAVANNAH IN SAVANNAH, GA.
★ The ST. CHARLES IN NEW ORLEANS, LA.
★ The ANDREW JACKSON IN NASHVILLE, TENN.
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ILLUSTRATED FOLDERS SENT UPON REQUEST

DINKLER HOTELS,

CARLING DINKLER, President and General Manager

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